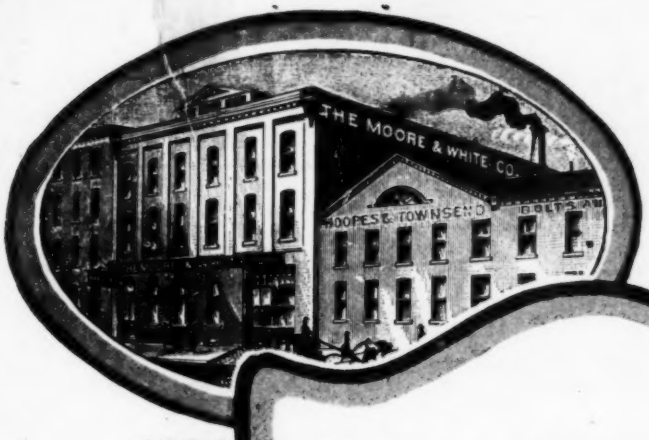

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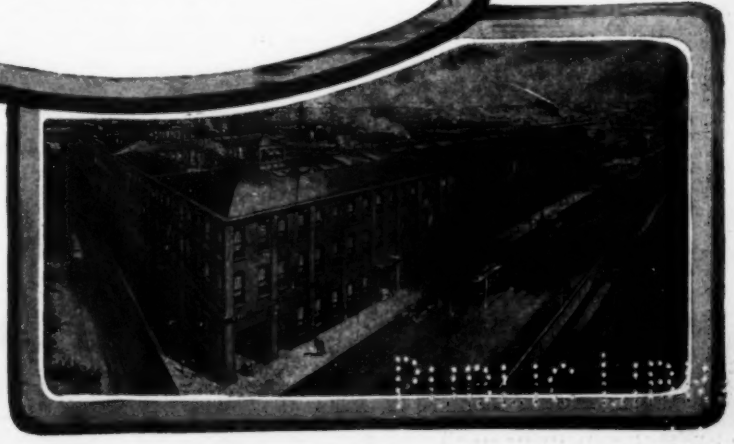

Vol. 3—No. 1

THE PAPER INDUSTRY

A. SCOTT DOWD
Editor

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of the Pulp and Paper Industry

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EDITORIAL

Work and Cooperate

COOPERATION is the thing that will bring back a state of normalcy in our industrial activity.

This has been said so often that the only thing we can hope to accomplish by reiterating it, is that if said a sufficient number of times and it becomes a belief, the preponderance of thought will bring the desired result.

It is true that that state of mind which gives us courage to lay our cards on the table is needed in these days of business depression.

As the success of any business depends on the effort that each individual puts into it, superintendents and technical men, mill hands and management should cooperate to their utmost to promote the welfare of the industry.

If it is true that the prices of commodities are coming down, then we should be content to receive a less amount for our labor. In doing this, we maintain an equilibrium in trade.

The demand for our product will revive when all industries observe the necessity of settling their disputes and resuming operations.

Working men of today are on a higher plane of living than ever before in the history of the world, and in order to maintain it, it becomes necessary to work harder, and if we don't do this, the foundation of the entire structure of our existence will fail, and we will find ourselves eventually in the mire of chaos.

We must put our trust in our fellow men and have faith in their ability, and in doing this reflect our own trustworthiness. Selfish interests must be abandoned if unanimity is to abide in our industrial relations.

We serve the same master and share the same hope. "To Live and Let Live" should be everyman's motto; and to live is to WORK, for by work do we LIVE.

It is believed that the curve is now on the rise and from now on our industrial activity will gradually increase. These indications are evidenced by the resumption of trade in the automobile industries. Many large automobile companies which very recently were closed are now operating on limited schedules, and before long expect to be back to normal productions.

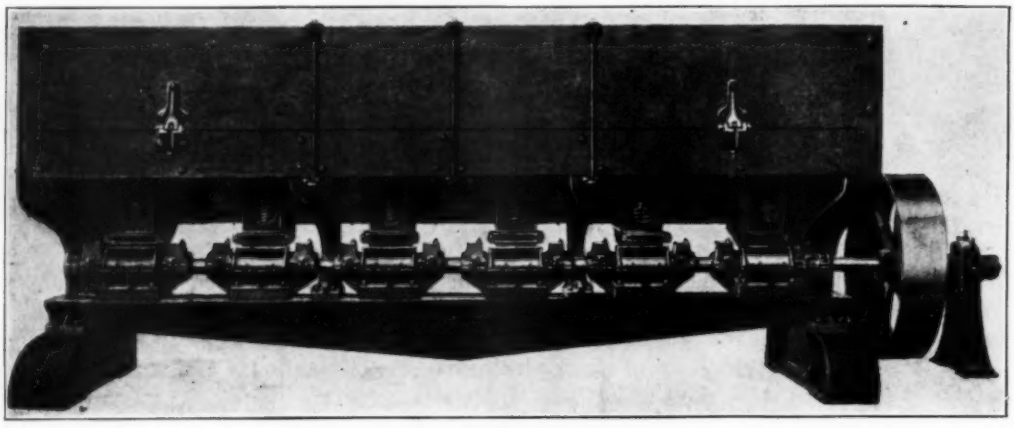
Building activity, though not yet commensurate with the demand, is steadily improving, and progress is reported in the readjustment of wages.

The crux of the paper situation now seems to lie in the prevailing high prices being charged by the printers. Big buyers of printing are waiting until this condition is adjusted and prices are lowered. Wage disputes are now pending in that industry, and it is hoped that this matter will be settled satisfactorily to all with a result which will enable that industry to fall into line with all others that have undergone price readjustment. With that obstacle removed, the demand for paper should soon be pronounced.

But the success of our future and the immediate chance of an early revival does not lie entirely outside of ourselves; it depends in a large measure on the settlement of the problems which exist in our own paper industry.

Cooperation is the Keynote! Let it be heard everywhere.

Pulp and Paper Mill Machinery



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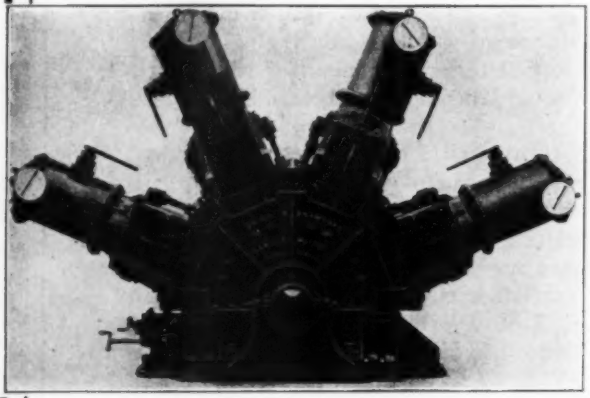

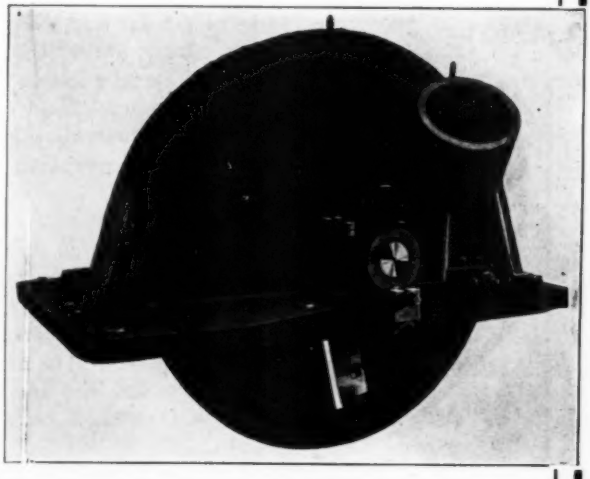

We also manufacture Cylinder Molds, Wet Machines, Barkers, Pumps, Iron, Brass, Bronze and Lead Castings

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Paper Market Recovering

THE paper market is slowly recovering. Like a man who has gone through a long and severe illness, the market has now reached its convalescent period.

But it must be borne in mind that care must be exercised with the patient, we must not indulge in an orgy of over-eating that his constitution cannot take care of. So with the convalescent market, no excess stimulation should be expected. Taking it all in all, the paper patient is doing pretty well, thank you. It must be perfectly apparent to the watchers at the bedside that all perpendicular declines have ceased, that in some lines prices have been maintained stable for the past sixty days, and that we are now hearing rumors of possible advances. There is something to be expected from that angle of the situation. Costs of material in a number of the paper lines have been ignored, and prices in their downward sweep have gone into the red figures. But the recovery is indubitable.

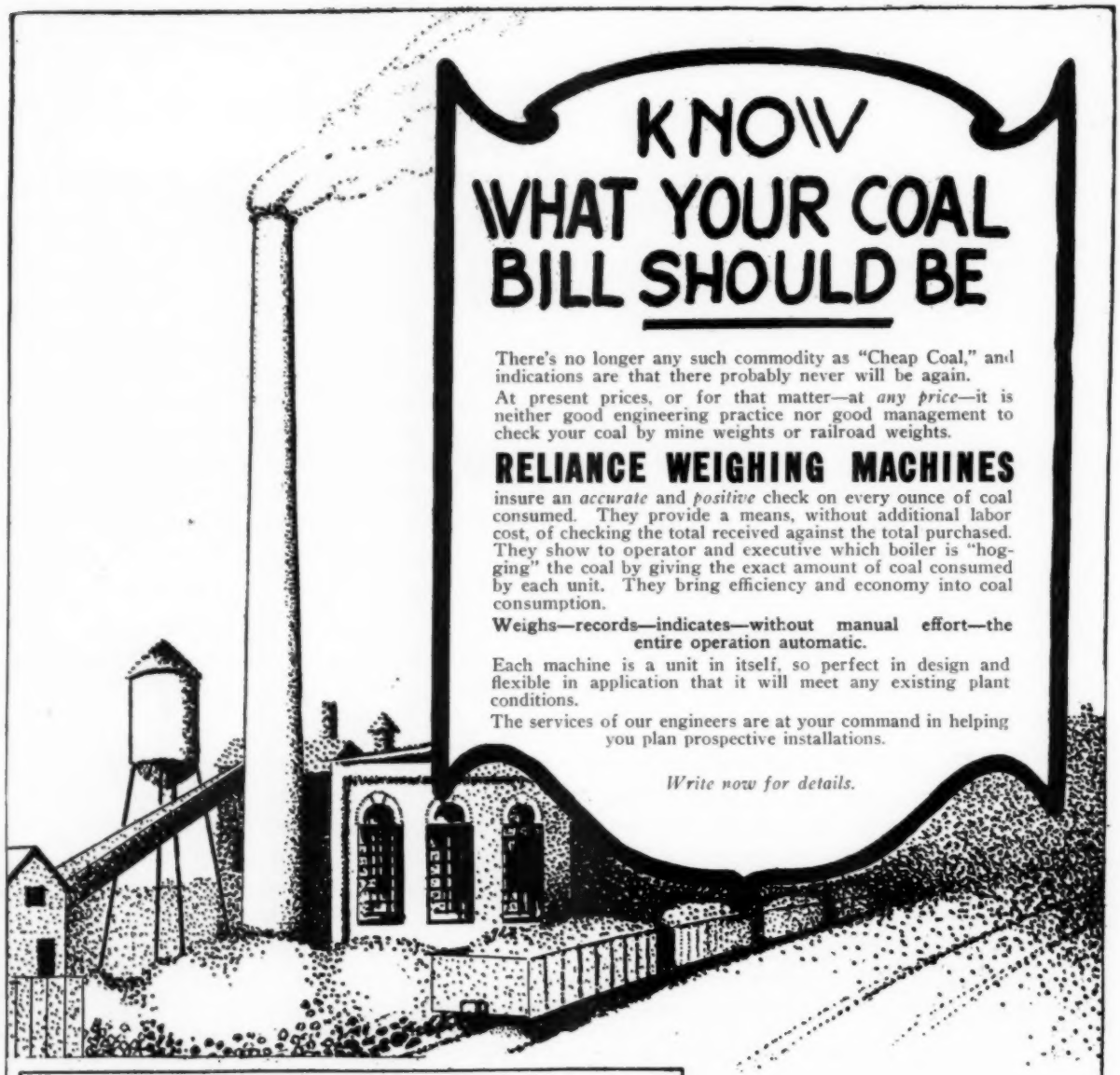
The reassuring symptoms in trade revival are many—finances are easier; the federal reserve ratio is still climbing; the gold importations are continuing. The heavy liquidation of inventories in the country are aboutaccomplished, and we are to be congratulated that the fatalities were so few and the liabilities so small, on the whole.

The future of transportation depends upon the settlement of the railway wage question, which is in a fair way accomplished now. The defeat of the radical labor element in the miners' strike in England is a distinct asset. Major crop prospects in America are good; the farmers are marketing their surplus grain from last season's crop, on which they made a bad mistake in holding it for speculation. High wages are still being paid all over the country and while production has been small, consumption has been fairly maintained, and a vast amount of merchandise has found its way into the consumer's hands, and thus relieved the retailers' and wholesalers' stocks to such an extent that they may safely commence rebuying and restocking.

All these factors have a distinct bearing on the paper market. Paper is used in every line of business to a greater or lesser extent. It is a universal commodity, and as other industries revive the demand for paper revives.

The one hundred and ten millions of people in these United States are living on a higher plane of civilization than ever practiced by any other people in the history of the world. They propose to maintain that living standard. The psychology of the situation, however, is that up to the first of the present month the great buying public had no confidence in commodity values, and since April 1st suspicions and doubts have been disappearing and buyers are learning now that with the great bulk of the liquidation safely over, they can purchase with comparative safety.

We call the attention of every merchant and manufacturer in the business to the beginning of next month, when if a further curtailment in the production of paper takes place through any cause whatever, it may turn out to be the psychological factor that may influence and usher in a broad buying movement.



KNOW WHAT YOUR COAL BILL SHOULD BE

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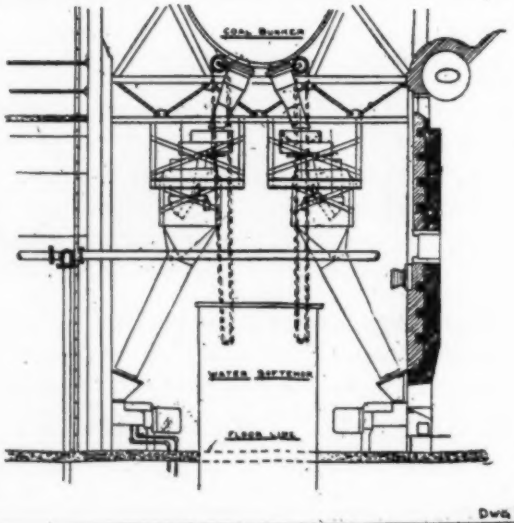

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LUDINGTON, MICHIGAN

Representatives in principal cities United States and Canada

The United States of Existence

By R. L. S.

AN association is a mental connection, a UNION, as defined by the dictionary. A mob or crowd of people is not essentially an association. On the battle field of Europe were millions of men bent on the same mission—destruction, but it would be silly to suppose that such a conglomeration of mankind exemplified a civilized sense of existence. A balancing of the books of war is also slowly convincing the world that this kind of lurid brainstorm has nothing to offer us in the line of constructive progress. A citizen of one of the defeated countries claimed that they had won the war, actually, because they had gotten rid of Royal topheaviness, reduced their overhead expenses and achieved a larger measure of self government. It remains to be proved that winning a war gives any real satisfaction, since he who dances always has the fiddler's bill to pay.

It is a question whether there was anything at stake beyond national ambition in the recent war up to the time Uncle Samuel took a hand from the standpoint of pure desire to bring about the end of national cyclones. Certainly, everybody is very much alive to the fact that, as usual, the trigger that set off the explosion had an ecclesiastical clutch rather than a civilized motive behind it.

Earth presents no more noble picture anywhere than when a stalwart band of level headed men intent on high ideals unite in a common purpose to better conditions. There is almost no limit to the achievement of such an association with this one proviso, that the motive be kept RIGHT. A machine may have a beautiful appearance, but if there is no suitable motive power behind it, nothing in the world can save it from the scrap heap. Organization requires a right motive, whether mechanical or human. Otherwise, it is a failure before it has started.

For instance, the United States of America is a success as a union because its birth was founded on a right motive. Subtract Christianity, Equality, Liberty from the organized fabric of this nation, and it would soon be a stranded wreck cast up on the shores of time. Rome had her dominance and ambition; Greece had her ethics, art and oratory, but each lacked the Plymouth Rock of CHARACTER. Where shall this land of ours turn if she shall forget the foundation of her being? And who is so equipped to maintain and cherish her integrity as are those business organizations promoted absolutely in the interest of progress. We need to have care that the impact of foreign thought is not allowed to prostitute our highest ideals.

Things are not always what they seem. Noise has no music unless it is obedient to law. Learning a formula may impart no intelligence. It is a great thing to live under those stars, to enjoy our own part in those stripes borne three times, that all mankind might have a larger view of what it means to live. But are we citizens, or do we just remain here, merely exist, clutching at all there is that is good and giving out nothing, only when squeezed like a sour lemon? If every man would make a survey of present conditions in the light of history, he will find that we have nothing to gain from ourselves by neglecting to tighten our belt from a moral standpoint, but very much to lose if past standards are not kept moving in an upward trend. Someone has said,

"To Do as Well as Our Fathers,
"We Must Do Better Than They."

KENWOOD employees are not overlooked in the growth of the Kenwood plant.

This two-story cement and brick Cafeteria and recreation building is devoted to their use.

It contains lunch room, auditorium and stage, smoking room, women's restroom and Doctor's quarters.

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Received Between October 1, 1920, and September 30, 1921

THE PAPER INDUSTRY was started with the one idea of being helpful to the whole Pulp and Paper Manufacturing Industry. We believe we have succeeded. At least many people tell us so, but we want to do more in being helpful, so that every man in the industry may know more of his chosen work.

Many men in this industry have valuable ideas that would be worth hundreds, possibly thousands of dollars, for other men to know, and at the same time will not harm the one man that knows it. The old idea of hiding our light under a bushel for fear someone else will learn of something that we may know has passed, and the war was to a large degree responsible for this. It is stated that America advanced more in most of the arts and sciences, as well as manufacturing processes, in the few years of the war period, than it had in fifty years before.

We lose nothing by giving out knowledge. If each of two men have a dollar and each gives his to the other, both will have the same and gain nothing, but if each of two men have an idea, and each gives away that which he has, he does not lose, but each has two, and so if we multiply this by one hundred or a thousand, each man that formerly had only one idea, now has a hundred or thousand, and no one has lost.

So, in order that the greatest number may have the greatest amount of knowledge, and in order to get men to take the time for the proper study and preparation of the right kind of an article, we will give to those who will endeavor to furnish us with real helpful articles, during the next twelve months, the following amounts:

For the best article furnished in this competition, we will give the sum of $300.00.
For the second best article we will pay $100.00.
For the third best article we will pay $50.00.
For the fourth best article we will pay $25.00.
For the fifth best article we will pay $15.00.
For the next thirty-one best articles, we will pay $10.00.
For the next forty best articles we will pay $5.00.

Any one man may write as many articles as he desires, providing they are on different subjects. Each article, however, should fill at least three pages of THE PAPER INDUSTRY.

Several well known men of the industry will be chosen as judges in this competition, their names to be announced at a later date, and the publisher of THE PAPER INDUSTRY will only decide first whether the article is worthy of publishing at all, and if so, then it will take its chance for the $300.00 prize.

In order to make it possible to publish these papers during the next twelve months, papers must begin to come in immediately and the minimum price of $5.00 will be paid for each as they are published, the balance representing the prize money will be awarded after the twelve months period has expired, and the decisions have been made.

Some men feel that they know many good things, but cannot write them down in proper fashion. It will not be necessary that these articles be written to show any great amount of learning, as many men who have had little schooling may be able to furnish the most helpful ideas, and it is something that is helpful that we want; we have an editor for the very purpose of carefully scrutinizing everything before it goes to the printer, so that it may be grammatically and typographically correct.

You can choose your own subject, as there are so many things to be written about in this great industry that we will not even attempt to outline the full list of subjects, but it may be of some plan to get a larger product out of a machine; it may be on the subject of saving in the power plant; saving bleach, dye, or one of many other things; it may be a plan to make the wire or felt last longer; some method of making a better sheet without increasing the cost, or making as good a sheet by reducing the cost; a new idea in the process of pulp making; in fact it can be on any subject that will be helpful to pulp and paper manufacturers, and their employes.

Anyone can try his hand, be he president, manager, superintendent, chemist, engineer, machinery man, foreman, or workman. If some one should feel they cannot write a long article, then write a short one. We will pay for it, if we can use it.

Start NOW and get your article or articles in at the earliest possible time.

Address all articles in this competition to

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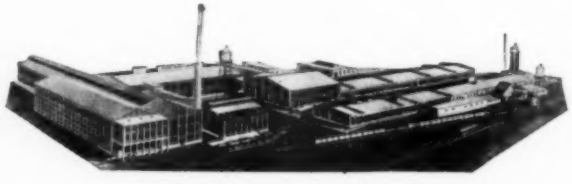
These four grades of paper made in our Mill by contended, conscientious and skilled folks.

Both jobber and customer will be satisfied; they get their money's worth in the purchase of KVP brands.



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KALAMAZOO, MICH.

The Forty-Fourth Annual Convention of the American Paper and Pulp Association

Held on April 11, 12, 13, 14 and 15, 1921, at the Waldorf-Astoria Hotel, New York

(By Special Correspondent)

IT was a notable convention! In point of attendance, in the number of separate meetings, in enthusiasm of those present, and, lastly and probably most important, in the good accomplished by the interchange of ideas and expressions of opinion on various subjects in the mind of the industry at present, the gathering of paper manufacturers in New York to attend the annual convention of the American Paper and Pulp Association at the Waldorf-Astoria Hotel on April 11 to 14 will doubtless go on record as being the most successful of any of the forty-three yearly conventions that have gone before.

Coming at just a time when the industry is greatly unsettled, owing to the abnormal conditions prevailing in practically every branch of manufacture and commerce, there is little question that those mill executives who attended this year's convention obtained information and ideas that will stand them in good stead during the remainder of the period of restabilization which the country is now passing through.

President W. J. Raybold

CO-OPERATION was the keynote of the convention. This keynote was sounded on all sides, by various speakers, at numerous conferences, and in conversations between individuals. Emphasis was laid on the fact that co-operation was an absolute necessity to bring the paper and pulp industry from the bottom of the gorge of depression and inactivity now obtaining, through the remaining months of uncertainty and rehabilitation back to a state of normalcy and healthy activity.

The new officers of the American Paper and Pulp Association elected at the general meeting in the Astor Gallery of the Waldorf-Astoria on Thursday morning follow:

President, W. J. Raybold, of the B. D. Rising Paper Company, Housatonic, Mass.

Eastern Vice President, Henry W. Stokes, of the York Haven Paper Company, York Haven, Pa.

Western Vice President, Arthur L. Pratt, of the King Paper Company, Kalamazoo, Mich.

Members-at-Large of the Executive Committee, Col. W. E. Haskell, of the International Paper Company, New York, N. Y.; Lewis Bloch, of the Crown Willamette Paper Company, San Francisco, Cal.; William R. Shaffer, of the New Haven Pulp and Board Company, New Haven, Conn.

Mr. Raybold succeeds George W. Sisson, Jr., of the Racquette River Paper Company, Potsdam, N. Y., who for the past three years has faithfully and efficiently served the association as president. Mr. Stokes succeeds Frank L. Stevens, of the Stevens & Thompson Paper Company, North Hoosick, N. Y., and Mr. Pratt succeeds Arthur H. Nevius, of the Miami Paper Company, West Carrollton, O.

The election of these officials was unanimous. There was no opposing ticket. The Nominating Committee, composed of Frank L. Moore, chairman; D. Clark Everest, Arthur B. Daniels, Arthur H. Nevius and Allison Dodd, when called upon by President Sisson, who presided at the annual general meeting of the association, announced the names selected, and the election was voted without incident.

President Sisson touched on various matters and

problems of importance to the industry in his annual address. He spoke as follows:

Annual Address of President Sisson

I have the honor and privilege of presenting to you my third annual message on the occasion of this, the Forty-fourth Annual Convention of your Association.

That statement is suggestive. To me it means that I have been permitted to lead your activities during three vitally important years in the industry. To you it should bring the reflection that ours is an old and honorable organization, its history replete with developments of intense interest as they came along from year to year, a history filled with delightful personal reminiscence, but more than all, a history of continuous service in the most helpful manner to the paper industry and to our nation.

There will be in the future, I am sure, much more to the story of our honored Association. There is its vital living present, its wonderful expansion to meet present needs and its promise of a future of notable achievement and dependable service. The contribution of any organization to its own industry, to society, the State and Nation, is properly measured by the spirit, the attitude and the ideals of its membership as expressed in their daily activities in the conduct of the industry, and in the manner in which they participate broadly in the industrial, social and political life of the country.

Measured by this standard, my experience in Association work in connection with the paper industry for many years, confirms my faith that our Association and its individual members are ready to assume the responsibilities and accept the opportunities for service that our present important place in American industry demands. We are demonstrating daily our readiness to participate to the full in the broad activities and common problems of American industry, speaking with clear voice as the result of careful investigation and sound conclusion to the end that our influence may be felt effectively for the good of all.

A Genuine Federation

Commenting on the present form of organization of our Association, and speaking from an earnest desire for the very best results from our work, I wish to compliment our various affiliated organizations on the effective work they are doing and the particularly valuable service they are rendering in their respective fields, work which the parent Association should not do and indeed is not equipped to do. Our affiliated organizations should be sovereign in their particular sphere of detailed informational service to their members as to the class of product made, but at the same time they should remember that they are units in a larger entity, the American Paper and Pulp Association—a genuine federation—whose strength and capacity for service and protection to the entire industry is absolutely dependent on the loyalty and practical co-operation of its constituent members. I am glad to say that there has been a growing spirit of co-operation and wish to voice my appreciation of the fact that this has been particularly in evidence during the three years I have endeavored to serve you.

I cannot speak too highly of the kindness and consideration shown toward me and the work by those who have in charge the activities of our affiliated organizations, but I am inclined to think that our plan of organization still leaves something to be desired in the way of concentration of effort, and the building of a broad industry consciousness that knows no narrow bounds, corresponding to that national spirit which all true Americans have, and which is not at all incompatible with love for native state or locality.

Set Future Ideal

I, therefore, venture to suggest that there be made a careful study and tabulation of these organizations in their relation to one another and to the industry in general with a view to ascertaining what, if any, improvements may be found in the hope that a constructive program of future activities may be laid out and one which will set an ideal toward which we can work over a series of years. While the Association must take up the immediate pressing problem as it arises, we must not be simply opportunists in our Association work, but should make a comprehensive survey of present conditions and future possibilities so that we may lay down some such broad plan of operation as will not only avoid duplication of effort and expenditure, but lead to tangible results along the definite course we may map out. I suggest that the Executive Committee, or perhaps better, a special committee appointed for the purpose, be authorized to make such study and survey as is here indicated and report its findings to your body.

Such times as these test men and institutions. As they meet such emergencies as are now pressing on every side, so may they be measured and judged. The time calls for men of sanity, clarity of vision, steadfastness and adherence to tried and proven ways. The old admonition, "Prove all things, hold fast to that which is good," might well be repeated again and again until it finds response and till the tumult of uneasiness and apprehension that is, after all, but the child of fear and the evidence of a vision beclouded by poor perspective and hasty or entirely incorrect evaluation of the things that really count.

Wise action is the result of exact knowledge. It is a matter of congratulation that we have today, as the result of the wisely conducted economic studies in our various branches, a body of facts and principles touching the paper business in its every phase, which provides the individual with a basis for judgment and action if he will but avail himself of it. Let us have done with "wiggle-wobble" in the paper industry. We must challenge our emotions with our intellect, our

fears with definite knowledge, and thus contribute to that stability and sanity which should be always characteristic of an industry of such permanence and dignified character and so indispensable to modern business and society as is ours.

Government Relations

I have, on former occasions, directed your attention to the disastrous effect of government control of or interference with industry. The centralized control of industry which we witnessed during the war period, turned the heads of many who still instinctively turn to the government to find an easy way out in the solution of our industrial and transportation problems. It is time to call a halt on this tendency. America's motto should be, "More business in government, less government in business." It is of immediate interest to note that the final report of the War Industries Board, just completed, suggests the encouragement by the government of associations in industry, holding that great public benefit can be effected through the mutual co-operation of members of industrial groups as was done during the war, and that the present government policy of enforced isolation and costly competition is not conducive to the general welfare. This has a hopeful sound and is, of course, the result of the experience of men with trained business minds fully aware that the only sound foundation for the property of industry is free and fair co-operation.

A refreshing note is also struck by Mr. Hoover, who has high conception of the duties and relation of his department toward industry. He states that "it should be in the widest sense a department of **service** to the commerce and industry of the country; that "it is not a department for the **regulation** of trade and industry;" and that in order to do service to the greatest advantage he "wishes to establish a wider and better organized co-operation with the trade and commercial associations and will, in a short time, present plans to this end."

Obligation to Nation

The experience of business men, and particularly men engaged in creative industry, is a valuable asset to any country. Their experience should be one of the most important contributions to the social and political thought of the day. But how has this experience expressed itself? It has done so too often individually, sometimes conflictingly, and rather in terms of resentment and exasperation at the failure of the government to reflect practical experience and wisdom in the management of affairs, than a determined attempt to **make it do so.** If, in a period bristling with critical problems with which you are unusually familiar and dealing with policies in which you have an extraordinary interest, the Government and legislative bodies do not receive the concrete, constructive, collective suggestion which you **business men** are capable of giving, then you fail in your obligation to industry, to society and to the government itself.

And so I am pleading with you to think these things out to definite conclusions. To think hard—to define your meaning clearly and lay down a maxim of conduct or method of procedure is a process which hurts—and few indulge in it. Moreover, to think definitely is to will; but where there is no adequate expression of the will in action there is no practical will and no thought in concrete form. Abuses, inefficiency and extravagance in government exist just so long as the public will is either dormant or else exhausts itself in talk, and no longer.

There is not much that is new under the sun in the matter of politics; but there is no limit to the number of doctrines and dogmas about society and property. For each of these day-dreams some light-headed idealist imagines a political device, generally a modification of a well-tried political or economic structure. Like everything doctrinaire, the novelty of the vision consists in the substitution for experience and conservatism of theory and credulity. Folly wants a chance to discredit wisdom. It appears as if at intervals there must be periods, longer or shorter, of destructive chaos undoing the constructive work of several generations. The recurrence to reason brings old and tried ways, with curious, though forward looking leadership by intelligent men. Labor, honor, thought and thrift are the divine foundations of human well-being. No legislative legerdemain can take the place of these four fundamentals. We sorely need to realize this truth just now. Again, the ancient error is repeated, that the world never before experienced such a period as that upon which we are now embarked, and once more is heard the cry that legislative enactments can repeal the laws of nature and make unnecessary the practice of human virtue. Let us not be deceived to our own undoing. No statute can transform idleness into industry, thoughtlessness into wisdom, thriftlessness into economy.

If we are to have our legislation divorced from political and party expediency and freed from the coercion of class pressure or demand, if we are to have the distinctive benefits of representative government, we must cherish the assertion of honest independence of able men in legislative or administrative positions as a most precious part of our political being. If we are to preserve the essentials of liberty, we must hold in peculiar honor those who, in the face of all manner of public clamor and personal pressure, keep alive the vital principles of liberty and of rational government.

Industrial Relations

Never have American manufacturers given more thoughtful and sympathetic study to employment relations. Their successful establishment and main-

tenance are indispensable to efficient production. Their continuity or interruption are at once of the deepest personal concern to management, wage earner and the consuming public, whose prosperity and comfort are dependent upon uninterrupted production and distribution. Successful human relation, whether with individuals or groups, requires continuous personal contact. A sense of reciprocal personal interest and sympathy will go far to maintain sound employment relations. Fully realizing that just and sympathetic personal relations between worker and management are the insistent necessity of the day, I believe that the rapid spread and spontaneous support of the open shop movement is but a natural reaction to the extremes of conduct and assertion, local and national, of closed shop unionism. It is not in any sense, as has been charged, "a conspiracy of employers," but flows from an increasingly insistent and very significant **popular** demand for the recognition and restoration of principles as old as our institutions. It is a notice from the American people that individual opportunity and security must be preserved and that the paramount public interest must be accepted by employer and employee as the test of their conduct, that the supreme allegiance of the citizen is to his Government and that every private organization, whether of workers or employers, must accept legal responsibility for the exercise of its power and live in complete subordination to the authority of the nation.

It is inevitable in a period of readjustment and deflation, that grave problems should arise and that the most difficult of these should be those relating to the labor factor in production costs. A labor policy that is economically unsound cannot long endure, for it can only result in disaster to the industry which attempts to maintain it.

The final test of a labor policy is its success in bringing about a higher degree of individual development in the worker and more genuine contentment in industry. To do this, it must be economically sound, systematically organized and must recognize with clearness and sympathy the social interests involved.

All industries are faced today with a demand for lower prices on finished products, and a normal balance of exchange value as between commodities will not be restored and business activity again be manifest, until all the factors that have made for inflation, including labor, are readjusted. In this problem of wage adjustment, American business enterprises should deal with their employees in a manner to commend themselves to their sense of justice, and at the same time, keep in mind the necessities of the consumer. Failure in either respect will embarrass industry and those who are attempting to revive business. This is no time to press for undue advantage. It is a time to cultivate a friendly relation between all the elements of production, whether represented by investment or by labor.

From a social standpoint, the cost of living becomes an important factor in determining wages. In response to its mounting figures, wage rates were frequently and liberally advanced to keep full pace with living costs. This fact establishes the propriety of recognizing the rapidly declining figures in cost of living in adjustment of wage rates to meet changed conditions. This will make most timely the presentation at our afternoon session by Magnus W. Alexander, Managing Director of the National Industrial Conference Board, of charts and diagrams giving the results to date of their exhaustive studies on the cost of living. These are based on actual retail prices covering the average family budget. A careful study and analysis of these charts should be made and the facts so clearly shown applied to the paper industry, giving due regard to local conditions or changes already made.

National Industrial Conference Board

While many industrial associations have been and are now performing indispensable service to their members in the study of industrial problems, they had, until the creation of the National Industrial Conference Board, no efficient machinery to co-ordinate their efforts in dealing with problems common to all. To be effective, American industry must have a collective opinion and an appropriate channel through which to give authoritative expression to its collective judgment on questions vitally affecting the welfare of industry and of the nation. The Conference Board was formed for this purpose. It has, through its affiliated National and State Industrial Associations, a constituency of over 50,000 manufacturers, who employ in the aggregate between seven and eight million men and women. It can, therefore, be truly said that the Conference Board is the most representative body of American industry and can act when occasion arises as its authoritative spokesman. It is the purpose of the Board to be the research arm of American industry in the field of applied economics. It is an instrument for the ascertainment of **facts** and of the inevitable lessons which these facts teach, rather than for the presentation of personal opinion. In pursuance of this program a staff of experts in the field of industry and economics has made and is making searching inquiry into fundamental industrial and economic truths. Their research activities cover a wide field of study, as is shown by the Fifty Research and Special Reports already issued. These reports are frequently quoted from and commented upon in newspapers, technical journals and other periodicals. In many instances they have formed the basis for the fair settlement of controversies and have stimulated the development of amicable industrial relations.

It surely is a patriotic purpose to advance the prosperity and stability of American industry and its prestige at home and abroad, through the enlightened

understanding of industry's problems. In this patriotic spirit, the members of the Board, in which our own Association has active and efficient representation, are devoting much time and energy to the work. In the same patriotic spirit all American manufacturers and business men generally should give the Board liberal financial and moral support.

Taxation

At the root of all well ordered and permanent government is the question of taxation and public expenditure. The war aroused America to the inequality and inconsistency in existing systems of taxation and to the reckless expenditure of public money, alike in war and peace. The federal system lends itself to a mischievous concealment of raising funds by manifold forms of taxation, and to an unfair distribution of the burdens. Nothing short of such appalling outlays as were made for the prosecution of the war and its after results could bring our country to its senses regarding imperative reforms essential to the preservation of our national welfare. Much earnest study has been given to this question during the past year by many organizations and groups, and our own Association has participated through its Tax Committee in the exhaustive study made by the National Industrial Conference Board. Unanimity of findings or opinion was not to be expected, but the net result of this year of research cannot but be helpful. It is certain that steps will be taken to eliminate those features of taxation which **discourage** expansion of industry and which **encourage** extravagance and waste. Co-ordinate with any study of taxation or methods of raising revenue should be an equally earnest study and survey of **public expenditure,** and indeed this phase of the investigation merits the keener analysis and most searching probe. All movements to institute businesslike reforms in our government administration, such as are fostered by the National Budget Committee, should receive our earnest support as individuals and as an Association.

In speaking of taxation matters, I cannot refrain from pointing out the exceedingly valuable work completed during the past year under the guidance of our Special Income Tax Committee, the result of which is bound to be of permanent financial and educational value to the entire industry.

Tariff

Another demonstration of growing co-operative spirit and efficient team work, which would have been utterly impossible to achieve a few years ago in our industry, was the recent presentation before Congress of tariff matters touching the paper industry. The result has fully justified my suggestion made in this presence two years ago, that there should be made "a careful study of tariffs, past and present, an accumulation of information as to the views of individual manufacturers, and such other information as was necessary to an intelligent consideration of the subject; and finally, a **conference** by the various branches of the industry for the purpose of reconciling conflicting views as they might appear, and the mapping out of a plan of procedure which would show a united front when presenting our views to congressional committees."

Following this line of procedure our very efficient and thoroughly representative Tariff Committee, whose report will be given you today, developed and filed with the Congress a brief so admirably conceived, so comprehensive in scope and accurate in detail, as to receive general commendation. If, during the past year, this Association had done no other one thing than to stand sponsor for and assist in this work, it would have fully justified its existence.

Foreign Trade

Export trade in American-made papers is today faced with many disquieting features. Following heavy export shipments during the larger part of the past year there was a very restricted demand at the close of the year, and from all parts of the world there came cancellations or rejections. In all markets the financial conditions grew very acute. Our dollar reached such a premium that it became increasingly difficult for the foreign buyer to purchase from us. Simultaneously, our competitors, the Scandinavians, the Finns, and particularly the Germans, made prices on paper products considerably lower than any prevalent in this country. With the wage rates in these countries less than half those paid here, and with the incentive they have to make low prices in the countries whose currency is of greater value than their own, the American paper exporter is indeed practically barred from such markets. A deplorable feature of the situation is the apparent low ebb of commercial morality, the attitude which makes light of contracts and agreements, which are often repudiated. It is to be hoped, however, that during this period of adjustment the American manufacturer, looking to the future, will give such support to our reputable and well established exporters, who are working in sympathy and co-operation with the mills as will enable them to maintain their place in the markets of the world, so that we may preserve a permanent and growing American paper export trade.

Educational Activities

I wish to acknowledge the indispensable character of the work that is being done by the Technical Association on the Pulp and Paper Industry. Fortunate, indeed, is the industry that has such an organization dedicated to scientific research and the development of improved methods and new economies with which to meet the pressure of demand for lower production costs for both the domestic consumer and the maintenance of our position in the foreign market. We shall be glad to hear later today a recital of the present activities of the Technical Association.

Another agency which is rendering incalculable service to the paper industry is the Forest Products Laboratory at Madison. Its studies of special problems directly affecting paper making materials have already resulted in discoveries that should mean enormous savings to the industry. Provided with inadequate funds, its work has been assisted by voluntary contributions by the industry, and the thanks of the Association are due to Mr. D. C. Everest, of Wisconsin, for his self-sacrificing endeavors to secure funds that insure the continuance of the special investigations being made for our industry.

Our acknowledgments and thanks are also due to Dr. Stratton, Director of the Bureau of Standards in the Department of Commerce, at Washington. It is Dr. Stratton's desire to place his Bureau and its entire equipment at the service of industry, and in response to his invitation, an Advisory Committee from your Association has been appointed. This committee will work in harmony with the Bureau in the planning and carrying on of its experiments and investigation as touching the manufacture of paper.

Vocational Training

I have heretofore commended and asked your financial support for the proposed course of instruction for the employees of pulp and paper mills in the United States and Canada that has been in the course of preparation as the joint work of our own Technical Association and the Technical Section of the Canadian Pulp and Paper Association. The Joint Educational Committee of the two Associations has now completed the first two columns of the series of five prepared for paper mill workers. It is interesting to note that a detailed survey of the paper industry has been made by Mr. J. G. Wright, of the Federal Board for Vocational Education, to determine the proper classification of positions in the industry, the line of promotion, etc., as a guide in the upgrading and advancement of workers. This marks a new departure in industrial education and its adoption and adaptation by our mills cannot but be of great financial benefit to both employer and worker with increase of efficiency and a higher morale within the plant.

Information Service

At the time of our fall business meeting, there was presented to the Executive Committee by Dr. Baker, a suggested plan for educational activities, or rather an Informational Service, to be carried on by the Association. The object is to provide a service where any informative material about the industry can be secured, to serve the membership by distributing this information, and to establish a department where the outside public can go when it wishes to get exact data as to the paper industry as a whole. The service is established in the belief that the time is at hand in American industry when there should no longer be an unwillingness of industry to discuss its affairs with the public or with other industrial groups. Just as manufacturers today are co-operating in technical research, so must industry as a whole recognize the right of the public to know of its activities. A somewhat detailed outline of the proposed plans was sent to the entire membership with request for contributions not exceeding $100 from each, and up to this time we have received a little less than $7,000 toward the suggested sum of $15,000 as the adequate amount for the carrying on of a full year's effective work. Under authorization of the Executive Committee, this information service was started on April 1st, under the direction of Warren B. Bullock, a trained newspaper man, and it is to be hoped that it will so quickly demonstrate its usefulness that the balance of the funds needed will be forthcoming.

Forest Conservation

Our Association would be remiss in its duty to the industry and indeed to the public interest did it not give serious attention to the problem of a dependable raw material supply to perpetuate the paper industry in the United States. The study of measures of temporary relief as well as of long-time policy for guarantee of the future has now been well started and should be continued as one of the fundamental activities of this Association. There has been for many years a hazy feeling on the part of the general public that our natural resources of timber and forests were being depleted with no particular attention or foresight as to their replenishing. Now, however, there has come about a crystallization of opinion resulting from the presentation of a program which is the outcome of years of practical experience and careful study, and which, I am proud to say, is the outgrowth of the initiative and leadership of your Association through its very capable Forestry Committee, whose report will be presented today and to whom the thanks of the industry are especially due. That this program promises to meet the emergency and to afford a logical, practical and fair way of working out the problem of a continuous supply of forest products for our industry and our civilization is evidenced by the widespread approval of the program by practically all interests that have given particular attention to these matters in the past, and who have not till this time been able to find common ground for practical and sensible co-operation.

The relation of forestry to the paper industry is being daily realized as more and more vital. With the great sums involved in paper manufacturing plant investments, the paper industry is willing to do more than its share toward providing a future supply of raw material. In the last analysis the problem of the nation's paper supply is the problem of the timber supply. But it should be noted that the manufacture of paper is but one of the many methods of forest utilization and that the total demand for timber for other purposes exceeds many times that for the making of paper.

The American Paper and Pulp Association approves the policy set forth in the Snell Forestry bill, because it appears to be a fair adjustment of the respective rights of the timberland owner, the manufacturer, the converter and the consumer of forest products, which latter is the general public. We believe that this bill, in its provisions as to the management, protection and reproduction of our forests, properly apportions the task between federal and state governments and the private owner.

It will take many years to bring marked results and permanent relief through this program, and during this period the paper industry, particularly in the east, will be forced to the possible utilization of other species in increasing amounts, or be dependent upon the importation of a large percentage of its wood.

Commenting on the policy of Canada in prohibiting the export of pulpwood cut from Crown lands and the proposals emanating from various sources suggesting an embargo on freehold wood also, it is interesting to note that much of this publicity or propaganda comes from those who are striving to serve personal ends and who have little regard for the situation in its broad international aspects. The Underwood Resolution, providing for the orderly and amicable discussion of these matters with Canada, failed to receive the signature of President Wilson, but will be re-introduced at the coming session of Congress and will, we believe, result in some action. America does not desire to rob Canada of her birthright in her pulpwood resources, and no suggestion of retaliation was ever intended in the fair and truthful statement that both countries need raw materials which are produced or exist in the other country, and that arrangement for interchange of such resources should be upon some fair plan of co-operation helpful to industry on both sides of the line. We are glad that our neighbors to the north are in so strong position as to the production and sale of pulp and paper. The United States by its policy of an open market to them has provided a factor as essential to their success as are their natural resources. Indeed, the entire North American continent should be viewed as a single unit in this great industry. Within these two countries lie the possibilities that make for completeness in the industry. The forest resources, the fuel supply, the managerial and engineering capacity, and lastly, a market for the product which is as essential a factor in industrial success as any other of those mentioned, and without which natural resources could not be profitably utilized. Approached in this spirit on both sides, our economic problems will find a mutually satisfactory solution, and it is certain that if this pulpwood question could be taken out of politics and divorced from the influence of selfish promotion interests, it could be quickly adjusted by the practical men in the industry.

Woodland Section

The recent organization of a Woodlands section of our Association gives us a branch representing the woods' operators of the pulp and paper industry. This section has a definite program of activities, their principal purposes being to increase the efficiency of woods' operations, to encourage the practice of forestry on timberland holdings and to provide a medium

Picture taken at the Forty-fourth Annual Banquet of the American Paper and Pulp Association, April 14, 1921, at the Waldorf-Astoria Hotel, New York

for the gathering and dissemination of information which will promote the permanence of woods' operations in our industry. There are now eighty members of this section. Plans for 1921 include the collection of regular dependable statistics on pulpwood production and costs, and co-operative studies with the United States Forest Service on the relation of reforestation to pulpwood production. The program which was presented and discussed at their meeting yesterday gives evidence of the very practical and helpful nature of their work.

Affiliated Activities

In this transition period with rapidly fluctuating prices and costs, it is doubly important that our studies in cost accounting and their application to our situation be not neglected. This is no time to scrap our cost accounting work or to abandon well established trade customs which rest on sound economic foundations. The Cost Association is conducting a phase of the industry. It is making rapid growth in numbers and widening the sphere of its influence, rendering increasingly valuable service to its members.

The Salesman's Association, in a somewhat different field, serves the industry in one of its most important phases, and it is my belief that this Association is of sound benefit and deserving the support of our members.

The Superintendents' Association, in its field of practical study and application of personal experience in the actual daily processes of mill management and production, cannot but bring about greater efficiency, improved quality and lessened cost. Properly guided and directed, their work will reflect definite benefits upon the industry.

I cannot refrain from expressing what I know is the feeling of the industry as to the helpful and intelligent attitude of the trade papers. We have had their generous co-operation and support in all our activities. It is a pleasure to me to give public expression to our feeling of appreciation.

I may be pardoned a personal word in closing. I wish to voice first, my keen sense of the great honor shown me in asking me to lead your activities during the past three years. Feeling often inadequate to the task, it has been at once a joy and a genuine inspiration to give you at least the best that was in me. Whatever has been accomplished during these years is due solely to the splendid co-operative spirit that has been increasingly manifest on all sides in our work. To know men you must work with them, and in this work I have come to know and to value many of you as never before.

There is a great work ahead for this Association. Many difficult problems may confront us. To be permitted to assist even a little in their solution is an honor and a privilege to any man. The nation, too, needs our individual contribution and that of our organized industry in all the avenues in which its influence and ours may be working, and I prophesy that you—in years to come—or your sons —for it may take a long time—will be glad to look back on these days and say, "We are glad we played our full part in those great movements."

Following President Sisson's address, Dr. Hugh P. Baker, secretary and treasurer of the association, read his report, which will be found on page 153.

Bamboo as a Paper Making Material

By JOHN STEVENS, 3rd
Arthur D. Little, Inc.

IN discussing the paper-making qualities of bamboo, it is not by any means the intention of the writer to convey the impression that in this material we will eventually have a substitute for wood pulp in the American market. The fact that there is little to indicate at the present time that it will ever become an important factor in this country is indeed unfortunate. The paper-making art as it stands today is based primarily upon pulp wood as the chief raw material. In fact, we are so dependent upon wood that should its supply become exhausted most of our mills would be compelled to close their doors. Initial efforts directed toward a solution of this all-important problem of timber depletion have consisted largely in studies of possible substitutes, and during recent years we have been confronted with many startling announcements. The word "substitute" adequately describes most of these new fibrous raw materials, and its use at once relegates them into discard, as most of us know only too well that very few "substitutes" can take the place of the real thing in all respects.

On the other hand, many materials have been investigated which are exceedingly promising and which are well adapted to paper-making processes. Bamboo is one of these materials, although like most of the others it will probably find its greatest application in the land in which it is grown. Furthermore, with perhaps a very few exceptions, the problems of wood supply confronting American manufacturers will be solved only by an intelligent method of handling and perpetuating the wood itself. The slow growth of common pulp woods is a serious question, and a rational inventory of future supplies will illus-

trate clearly how foolhardy we have been in the consumption of this important natural resource. Were it possible to grow a plant in this climate which would reproduce itself annually and which would yield a fibre of high paper-making value, our problem would be simplified to a great extent.

The rapid growth and excellent adaptation of bamboo to existing paper-making processes have been the cause of exhaustive investigations which have recently led to the establishment of pulp and paper mills at its source of supply. The question of importing bamboo pulp into this country has also received considerable attention, and providing that steps are not soon taken to perpetuate our wood supply, this material should eventually find its way into American markets. However, with drastic changes occurring in our policy of forest control, we look forward to vastly improved conditions, and hopefully predict that it will not be necessary to reach out to far distant lands for raw material to keep our paper industry alive.

Propagation

Practically all annual fibre-yielding plants require extensive cultivation and harvesting during certain limited periods of the year. Bamboo, however, is one of a very few of these plants which needs practically no attention, and once it becomes fixed upon a district it is very difficult to get rid of it. The propagation of bamboo has been clearly described by Raitt as follows:

"The seeding of bamboo is one of the most extraordinary phenomena in the botanical world. It does not seed annually, but at cycles or periods, varying with the species, of from 40 to 60 years. Year after year it goes on propagating and spreading by extension of its roots and annual crops of stems, until the time arrives when it seems to realize that old age is approaching and its powers of annual root and stem propagation are getting less. It then throws all its remaining energy into the production of an enormous crop of seed, which it sheds literally by the bushel until the ground is carpeted with it, and having thus fulfilled its day and generation, incontinently dies. The seeds germinate with the next rains and produce a fresh renewed growth, full of new vigor and capable of continuing the annual root and stem propagation for another cycle. For the first few years, while the new root clumps are gathering strength, the stems thrown up are small, about a finger thick, but increase in size every year, until, at 5 years old, full-sized stems are produced and the whole area is again at its original fibre-yielding capacity."

Composition

Bamboo differs in its composition from pulp wood in that the cementing material binding the cellulose together consists of a larger proportion of pectose than lignin. It is largely due to this excessive amount of pectose that bamboo cannot be successfully pulped by the acid sulfite process. In fact, the pectose, which is of a gelatinous nature, hinders to some extent all pulping processes, since the first effect of solvent action is to form a colloidal film, which protects the tissues it encloses from further action by the solvent. This phenomenon is, of course, particularly noticeable in the sulfite process, and it has been conclusively shown that it is necessary to employ an alkaline cooking liquor to resolve bamboo into its constituent cellulose.

View of grove of "giant" timber bamboo at the U. S. Plant Introduction Field Station, on the Ogeachee Road, near Savannah, Ga. The tallest plants are about fifty feet in height.

Some Early Investigations

As early as 1870-1875, Thomas Routledge investigated the possibility of bamboo for the manufacture of paper. He found, among other things, that the best way to prepare the young bamboo stems for digesting was to pass them between crushing rolls and later through grooved rolls to split and shred the stems. The shredded material was then passed under Guillotine knives, which chopped it up into sections suitable for packing into a digester. The soda process was used in all cases to produce the pulp which he later had made into book paper. The cost of soda and bleach was very high, however, and his process was not successful from an economic standpoint.

The next attempt to utilize bamboo occurred in

1906 when Richmond conducted extensive experiments in the Philippines. He found that the most promising material offered was the moderate-sized, thin-walled bamboo (Schizotachym lumampao), which covers extensive, accessible areas in the Philippines. The soda process was used in these experiments, and it was found that the bamboo chips in-

View in interior of timber bamboo grove at U. S. Plant Introduction Field Station, near Savannah, Ga. These culms, or "stems," are two to four inches in diameter.

variably yield 43 to 45 per cent of air-dry unbleached fibre under the following conditions:

1. Upright cylindrical stationary digesters.
2. Direct live steam heat.
3. Fifteen to 20 per cent of 76 per cent caustic soda calculated on the air-dry weight of the raw material.
4. Time of cooking 4 to 6 hours.
5. Maximum temperature 160 degrees C. corresponding to a steam pressure of 90 pounds.

The fibre thus prepared was strong, of good felting capacity and bleached to a splendid white with 12 to 15 per cent of bleaching powder.

In 1908, Sindall investigated bamboo for paper-making for the India government. He also used the soda process and cooked the wood for 7 hours at 80 pounds pressure with a caustic liquor of 15 degrees Tw. The yield of pulp was over 50 per cent and produced a book paper which was very strong and which possessed a surface calculated to be most useful for special kinds of printing, particularly lithographic work. He found that bamboo paper is capable of standing considerable wear and tear and should therefore be especially suitable for modern book paper. The nodes were cut out in his experiments and only the internodes were utilized, these being crushed in rolls as before.

The work of Raitt in 1912 was far more exhaustive than that of other investigators in this field. Heretofore the sulfate process had never been tried for bamboo, but Raitt used it to good advantage and found it to be the best by far. He also found that the sulfite process was absolutely unsuitable for bamboo for the reason that the bleached pulp could not be produced without excessive bleaching costs. As a result of this work the following conclusions were drawn:

1. The nodes need not be rejected.
2. All species of bamboo may be mixed in treatment.
3. It is best not to cut the culms until the shoots of the year are fully grown.
4. A period of seasoning of not less than three months should elapse before the bamboo stems are used.

Raitt, therefore, utilized the entire stem of the bamboo, which he passed through crushing rolls very similar to those used in the sugar industry to squeeze the juice from sugar cane. The liquor used in his experiments contained 22 per cent total soda calculated on the dry weight of bamboo. The sulfate cook was conducted at 80-120 pounds pressure for a period of 5-6 hours. An easy bleaching pulp was produced by this process which was found to be of a high quality suitable for book papers.

Modern Experiments

Due to unsettled conditions brought on by the World War, very little was done with bamboo following the work of Raitt, but during the past two years investigations were resumed, and it is reported that several mills are now being erected in India and elsewhere. As there were various matters pertaining to the pulping of bamboo which had not been thoroughly studied, extensive experiments have been carried on recently in the laboratories of Arthur D. Little, Inc., to further demonstrate its paper-making value, particularly in the light of more modern methods of treatment. Results of these experiments, which have included a large number of paper-making trials, have demonstrated that bamboo occupies a most unique position in its adaptation to existing

methods of paper pulp production. A fibre of the highest quality is obtained which is comparable in every way to our present-day soda and sulfite pulps, the actual fibre length being only a trifle shorter than the latter.

The method of pulping bamboo is very similar to that employed for treating poplar wood by the soda process with the exception that the cooking liquor contains sodium sulfide as in the sulfate process. There are various ways of reducing bamboo to a condition suitable for the digester, although the main point to be considered is the disintegration of the nodes. As chipping and crushing are attended with many disadvantages, a simple shredding of the stems was tried with exceedingly satisfactory results. The nodes, which ordinarily present the greatest difficulty, were disintegrated and pulped with ease. The fibres in the nodes are much shorter than those of the internodes and are furthermore contaminated by the presence of pith, which has little value as a paper-making material. The relative amount of pith is small in comparison to the total bamboo stem, however, and consequently has little effect upon the quality of the resulting pulp. To obtain exact information in regard to the nodes, pulping trials were made on nodes alone which had been sawed from the stems. The unbleached and bleached yields were 47 and 41.6 per cent, respectively, and the bleach consumption was 30 per cent to produce a color comparable to that of the internodes when only 15 per cent of bleach was used. Corresponding yields obtained from the entire bamboo stem were 50 and 44 per cent. The cooking conditions found to be most suitable were as follows:

Caustic Soda—Twenty per cent of 76 per cent caustic on weight of dry bamboo.

Sodium Sulfide—Seven per cent on weight of dry bamboo.

Liquor—Eight pounds of liquor to one pound of bamboo.

Time of Cook—Six hours.

Pressure—Ninety pounds per square inch.

The washing, bleaching and liquor recovery processes for bamboo are carried on according to standard practice in soda and sulfate mills and present no difficulties other than those ordinarily met with. Due to the ease with which sulfate pulp from bamboo bleaches, it is apparent that the field which gives the most promise for its use is the manufacture of papers such as books and writings, where a pulp of a high white color is required. Bleached bamboo pulp is particularly adapted to a great many varieties of book papers since it produces a soft, well closed sheet, which is extremely opaque and which bulks well with a high finish.

The most convincing argument in favor of bamboo, or any other paper-making material, is, of course, the exhibition of samples of paper made therefrom, and it is indeed unfortunate that the excellent samples of book paper which have been made cannot be shown in conjunction with this article.

Possibilities of American Use

Summing up the possibilities of bamboo as a paper-making material, it, therefore, appears that, while an excellent pulp can be produced, its introduction into the American market is problematical and dependent upon many other factors, the most important of which are the questions of reforestation and domestic cultivation of bamboo. In other words, if our forests can be successfully perpetuated, there would be little advantage in importing bamboo pulp from far-distant lands, but, on the other hand, if bamboo could be cultivated in this country, it is quite probable that for many purposes it would be preferred to pulp woods and would be used extensively in the paper trade. This matter, of course, opens up many interesting possibilities, and we accordingly have had occasion to review the present situation, particularly in California and in our Southern states.

It is a popular misconception that bamboo grows only in the tropics. Japan is a land of bamboo and yet where these plants grow it is not so warm in winter as it is in California. Clumps of the more hardy kinds of bamboo may be seen occasionally in private gardens or public parks in the South, even as far north as Washington. In California, where the Japanese species thrive very well, there are many large specimens and even one small forest. There are no commercial bamboo plantations in this state, however, the planting being chiefly for ornamental purposes. The United States Plant Introduction gardens at Chico, California, have been successful in growing a giant variety which is a very hardy and prolific species of considerable promise. It is the general consensus of opinion, however, that, for the most part, lands suitable to the cultivation of bamboo are probably too valuable for this crop.

In view of the facts at hand, it is extremely doubtful that bamboo will become a factor in the American paper industry for some time to come, if ever. On the other hand, should the Department of Agriculture be successful in introducing suitable varieties into this country on a commercial scale, the situation would be quite the reverse.

A brief consideration of the chemical changes involved in the decay of the four chief pulp woods, viz., spruce, balsam, hemlock, and aspen, throws additional light on the astounding losses sustained through the decay of wood and the further losses involved in the pulping of such infected woods.

You cannot turn a 'possum into a watch dog, because he believes in a policy of going to sleep at a critical time. Careless men have a brain somewhat similar to a 'possum, says the National Safety Council.

How to Increase the Efficiency of Water-power Plants

By CHARLES M. ALLEN, M. S.

Professor of Hydraulic Engineering, Worcester Polytechnic Institute

Presented at the Sixth Annual Meeting of the Technical Association of the Pulp and Paper Industry, on April 13, 1921, at the Waldorf-Astoria Hotel, New York.

BEFORE taking up the main subject of the paper, it might be of interest to describe briefly the apparatus used in the brake testing of water wheels after installation.*

It was on account of the ability of this apparatus to successfully handle loads up to 5,000 hp. and more, that made it possible to make several hundred brake tests of water wheels in the field.

The Alden dynamometer is a more or less highly

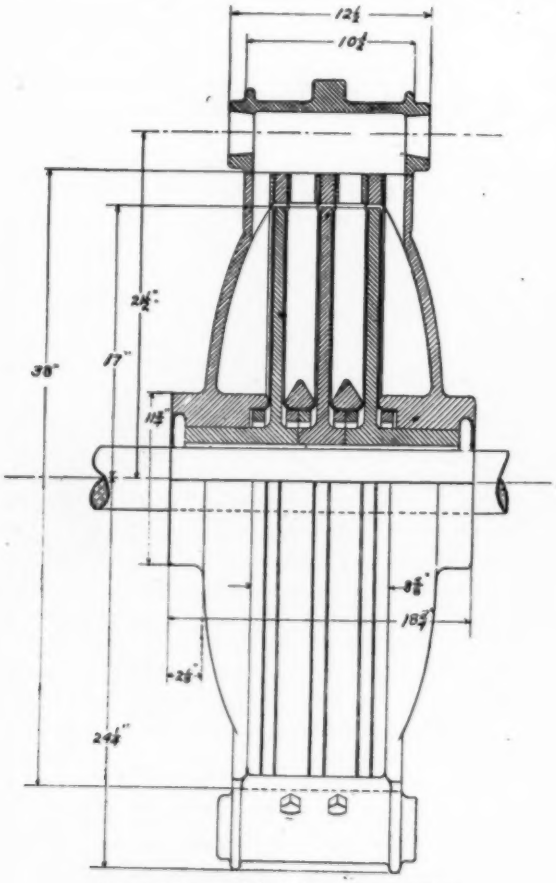


Fig. 1—Three-Disk Alden Dynamometer

organized form of Prony brake and usually consists of several smooth circular revolving cast iron disks keyed to the shaft which transmits the power; a non-revolvable housing having its bearings upon the hubs of the revolving disks; and a pair of thin copper plates in contact with each cast iron disk, the plates being integral with the housing. (See Fig. 1.) Through a system of piping, water under pressure is circulated through chambers between the units, each consisting of a disk and its copper plates, and between the outer plate at either end and the wall of the housing. The water pressure is regulated by hand or in some cases by an automatic valve.

Another system of piping circulates oil for lubricating the surface of the copper plates next to the revolving disks. Oil is usually forced through the circulating system by means of air pressure on a considerable supply of oil contained in a pressure tank. The oil enters the chambers at the circumference and is forced along the radial grooves of the disks to the hub and discharged through the bearings. When oil

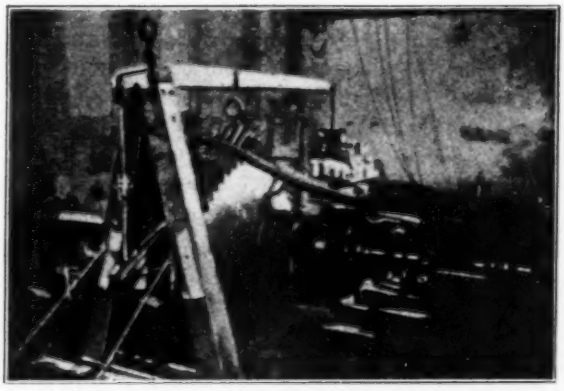


Fig. 2—Dynamometer set up in place of a generator, ready for test

appears at the main bearings of the dynamometer it indicates complete lubrication of all the moving parts. When the dynamometer is in use, water passes through the chambers of the housing and between the several units of plates and disks and by its pressure tends to force the plates against the side of the revolving disk. This pressure increases the friction between the disks and the plates, and this friction offers resistance to the rotation of the disks. The construction resembles that of a constantly slipping friction disk clutch. The resistance to turning imposed by the friction plates and disks is balanced by the weighing apparatus. The power transmitted from the wheel under test tends to rotate the housing. This tendency is counteracted by the dead weight on the scale pan suspended from levers or by means of platform scales. The weighing ap-

*See Transactions A. S. M. E., Vol. XXXII, p. 275.

paratus by which the power absorbed is measured is delicately adjusted on knife-edge bearings. By means of the overhead lever the load is not only weighed and measured, but also serves to take the weight of the housing from the bearings on the hub of the revolving disks. It is possible to take from the bearings not only the weight of the dynamometer, but also the weight of the shaft in horizontal units. In vertical setups, the weight of the brake is taken off

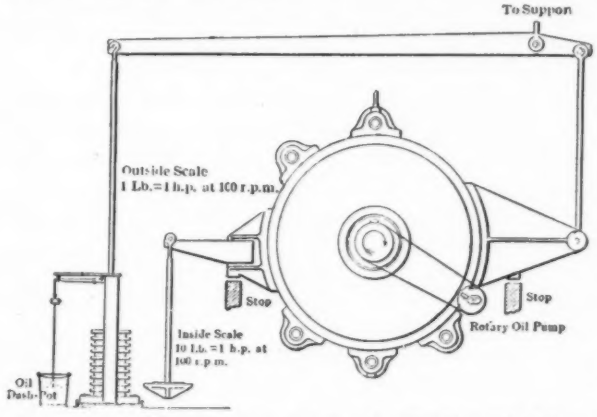


Fig. 3—Sketch of Dynamometer Showing Working Principles

by counterbalancing. By this means no additional load is put on the wheel bearings due to the weight of the dynamometer. (See Fig. 3.)

To calibrate the dynamometer requires simply the determination of the distance from the center of the shaft to the knife edge bearing of the lever rod and the ratio of the overhead lever and the standardization of platform scales. It is also necessary to determine the initial load on the dynamometer due to the unbalanced effect of piping, fittings, arms, stops, lever and scale pan. This is done at the time of test and with the apparatus as used. On a horizontal setup the usual method employed consists in disconnecting the shaft coupling and raising the dynamometer so that level parallel irons can be placed under the shaft. By means of a strut under the knife edge on the end of the lever the correct weight of the initial load is then obtained by the use of platform scales. (See Fig. 2.)

A brake test in the field has several advantages over an electrical test. With the brake test, the wheel can be operated at various speeds at different gate openings, and in this way complete characteristics of the wheel determined. This is not possible with the electrical test because the speed of the wheel must be the same for all gate openings unless the generator is given an individual rheostat load and even then any wide variation from the normal speed throws in some doubt as to the efficiency of the generator under these new speed conditions. The dynamometer can be easily calibrated on the ground where all parties interested can check up all measurements and be absolutely sure the true output of the wheels is determined.

The water measurements of wheel discharge under test very often introduce a good many difficulties. The particular setting of the wheels is a determining factor as to what method of measurement shall be used. However, in most cases, some one of the standard methods can be used which will give results sufficiently accurate for all commercial requirements.

During the past twenty-five years experience in making field tests of water wheels including both new and old installations and covering a territory including nearly all of the United States east of the Mississippi and also the province of Quebec, an excellent opportunity was given to find out how water wheels have been set up and operated.

Waterpower Plants Usually Neglected

It is a curious fact but one well worth contemplating, that in a large number of manufacturing plants using both steam and waterpower, the steam plant usually receives most excellent attention, while the waterpower plant gets little if any. Waterpower users in such plants do not fully realize that the horsepower developed by the water wheel is just as powerful and just as valuable (though apparently not as respectable) as one developed by the steam engine or turbine. Some people seem to think waterpower costs nothing after the wheels are installed perhaps because they do not get a water bill every month, while with a steam plant the monthly coal bill makes a different impression. The above applies to isolated plants that own their water rights. For

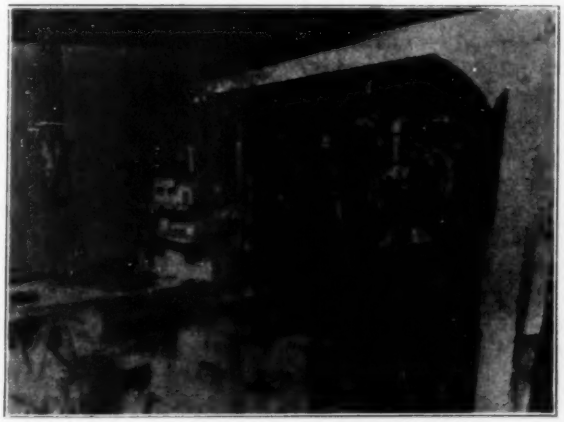


Fig. 4—Determining the initial load of dynamometer. Shaft resting on level parallel irons

example, a paper mill on a perfectly good water privilege capable of furnishing the entire power demand of the mill but actually making up from 1000 to 2000 Kw. by steam simply from lack of attention in operating and properly equipping the hydraulic plant.

The present and probably future high cost of coal and its transportation is at least one perfectly good reason why it is going to pay from now on to look after power plant efficiency. On account of this in-

creased cost of fuel a large number of small water-powers can be developed and successfully financed today that had to be passed by only a few years ago.

The purpose of this paper, however, is to point out how existing plants may be operated more efficiently. In a large number of cases, the first thing to do is to determine the present operating efficiency. This point has been sadly neglected in the past. In hydroelectric stations it is just as important to know the "water

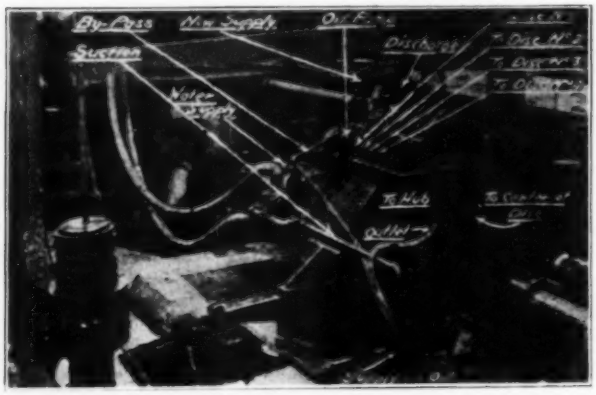


Fig. 5—60-in. four-disk dynamometer; capacity 3,000 h.p. at 200 r.p.m.

input" as the "watt output" if a plant is to be successfully operated. In these stations the switchboard is usually covered with all kinds of instruments, both indicating and recording, but having to do only with the electrical output. Very seldom will any apparatus be found that either records or indicates the water input.

In groundwood mills, it is just as important to know how much water is used under a given head as to know the groundwood output of the plant if the highest operating efficiency is to be attained. As an example of what is sometimes found, a mill comprised of six units of 2000 hp. capacity was operated over a year where the rule was never to run a grinder unit unless it was run at full gate. Power and efficiency tests were made and it was found tnat very little if any more power was developed by the wheels above .85 gate, but that the discharge continued to increase up to full gate. After the tests were made, the wheels were never opened above .85 gate and practically enough water was saved by running five units at .85 gate to operate the sixth unit. The saving was immediately noticed in the mill, and whereas this mill had been buying pulp from Canada it now furnishes all it needs.

Experience in testing wheels in place has shown that although there are some water wheels that have been operating even thirty to forty years and are still doing good work, yet a much larger number should be sent to the scrap heap and replaced with modern high efficiency wheels.

Improper Settings of Wheels

One of the principal causes of low operating efficiency is due to improper settings of wheels. It is impossible to make a poor wheel an efficient one by placing it in a good setting, but an efficient wheel can be tremendously crippled by placing it in a poor setting. By setting is meant the intake, casing or flume, draft tube, and tail race.

A marked improvement in wheel settings has been made in the past ten years, but there is still room for more, especially by some wheel builders. Generally speaking, the wheel manufacturers who have conducted the greatest number of actual tests in the field are the ones most capable of putting in the best installations.

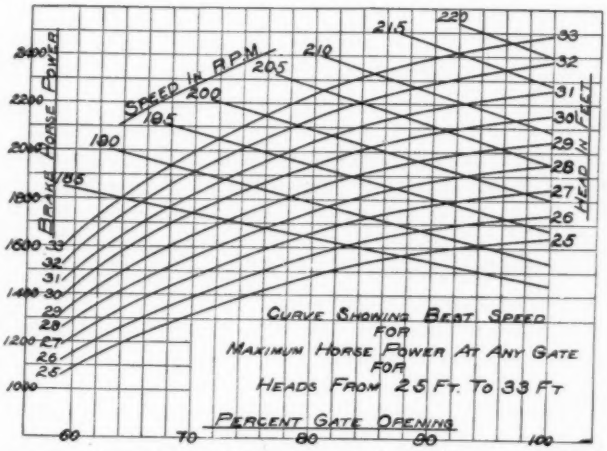
In many cases, the mill or factory has grown from small demands of power to larger and in order to meet these demands larger wheels have been installed in the original settings. With the exception of a few rare cases, this is bad practice so far as the efficiency in the use of water is concerned; and in a good many cases very little if any power was obtained. As an example of this type of practice, a plant was operated by wheels that had increased the capacity of the plant from a unit of 700 to a unit of 2,800. New wheels had been installed in the old flumes to get this increased capacity, but at the cost of a very marked decrease in efficiency. Not only that, but the main shafting had been kept the same and was only replaced when it broke. The policy of the concern was to repair damages after the breakdown and charge it up to an act of Providence.

If after testing, the plant is found to be down in efficiency, a first class engineer should be consulted. It then becomes a matter of good engineering and arithmetic as to whether the possible increased efficiency will finance itself. A considerable increase in power and efficiency can be obtained at little or no expense by simply taking as good care of the water-power installations as is ordinarily given to steam power plants. For example, water wheels should be inspected every month or two to make sure the shafts are lined up, that the runners have the proper clearance, are free from debris, etc. There are too many operators as well as men higher up that never give water wheels much thought until something happens. In some plants it takes the oldest living employee to tell not only when the wheels were last inspected, but sometimes where they are located. A breakdrown can often be avoided and a much higher operating efficiency secured by a continuous systematic inspection.

Trash racks should be kept free; a considerable loss in head occurs at this point from neglect. This loss in head becomes a greater loss in power because if the wheels were properly chosen for the normal head, any reduction causes the wheel to operate at the wrong speed for best efficiency, especially at the part gate loads. The loss of head at the racks in low head plants may become a serious one. For example, a plant consisting of ten or eleven units

of approximately 2,000 hp. each having racks 29 ft. long and having accumulated bark, etc., to a depth of 16 to 17 feet from the bottom uses only the upper 12 to 13 ft. of rack, primarily because the man whose business it was to keep the racks clear had rake handles only that long.

If old style vertical wheels stand idle during low water periods, the buckets very often become covered with tubercles which unless cleaned decrease their efficiency, sometimes from 10 to 15 per cent and the

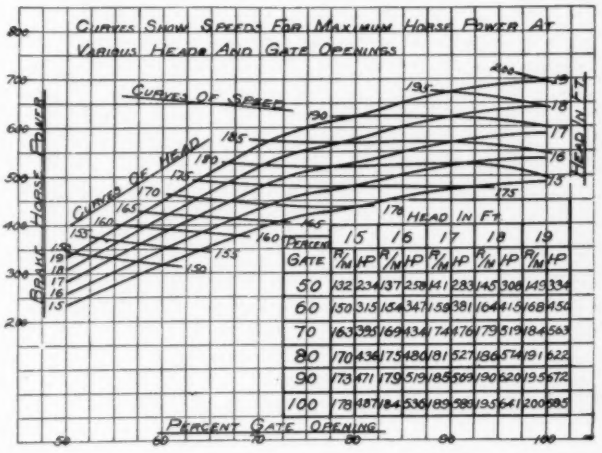

Brake Horse Power
Speed in RPM
Head in Feet
Curve Showing Best Speed For Maximum Horse Power At Any Gate For Heads From 25 Ft. To 33 Ft.
Percent Gate Opening

power from 20 to 30 per cent, depending somewhat on the size of the wheel.

It is always advisable to send a man who understands instructions if it is to be his job to clean runners and guide vanes. This remark is caused by experiences of this sort where men were sent in to clean the runners and all that they did was to scrape off the slime and collection of dirt from the outside of the wheel casing and give it a coat of red paint, not even touching the guide vanes and buckets.

Obstructions in the draft tube and tail race causing water to back up, thus reducing the head, are all too common. One of the worst cases of this sort occurred at a new hydroelectric plant where the wheels had been operating about a year, and comparatively little power was obtained. A test was called for, and the actual horsepower of the unit showed about 100 instead of 800, the guaranteed output. Investigations were made, and it was discovered that the boiler makers had built a staging platform directly under the end of the vertical draft tube and this platform for some unaccountable reason was left in. The only possible chance the water had of getting through that unit was between the cracks in the planks. While this sort of thing is unusual, it only goes to show how some things get by.

Not operating head gates wide enough owing to a poor rig or laziness on the part of the operators is a very frequent cause of reduced head and is really inexcusable. Quite a large number of new plants have been operated for a considerable time before a test was made and were found to have been operated with the head gates partly closed,—the only excuse offered was that operators were afraid the gates would stick if they were opened any wider. (The same reasoning applied all the way up.) A good many old plants have been operated during their life with head gates partially closed, one plant in particular having been operated twelve years with the gates opened only 8 ft. instead of 18 ft., thus losing nearly 2 ft. head between forebay and open flume, the reason for this being that bolts in the gate stems


Curves Show Speeds For Maximum Horse Power At Various Heads And Gate Openings
Curves Of Speed
Curves Of Head
Brake Horse Power
Head In Ft.
Percent Gate Opening

Percent Gate	15 R/M	15 HP	16 R/M	16 HP	17 R/M	17 HP	18 R/M	18 HP	19 R/M	19 HP
50	132	234	137	258	141	283	145	308	149	334
60	150	315	154	347	158	381	164	415	168	456
70	163	395	169	434	174	476	179	519	184	563
80	170	434	175	480	181	527	186	574	191	622
90	173	471	179	519	185	569	190	620	195	672
100	178	487	184	536	189	583	195	641	200	695

hit a channel iron which ran along the entire front of the power station. Apparently the loss in head had either not been discovered or else was not thought of enough importance during that time. Records show that the head was taken from the forebay to tail water instead of from the head water in the open flume.

If the head gates are used frequently, and they should be in most plants, power-operated gates of some sort should be installed. They should pay for themselves in a short time not only in the saving of labor, but in the increased efficiency of the plant because of more frequent inspections. If wheels are shut down any considerable length of time on account of low water, the head gates should be closed and cindered to prevent all possible leaks. The wheel gates are not usually tight enough for this purpose. In one plant what is commonly known as the "bull gang" made up of eight or ten huskies, spent a considerable portion of their time opening and closing head gates and sluice gates by means of jack screws and chain hoists, and at a time when labor costs were at their highest.

Proper Speeds to Operate Wheels

In groundwood mills, tests have shown that wheels are often operated at the wrong speeds for maximum power and efficiency. The accompanying charts give curves showing the proper speeds to operate the wheels to give maximum horsepower for different heads and gate openings. These charts combined with the use of a tachometer on the wheel shaft

and net head gages give the groundwood foreman all the power data he needs to get the maximum output from his units. On general principles, the maximum output of groundwood will occur when the wheels are developing their maximum power. In some plants groundwood foremen apparently insist on running the wheels at some definite speed regardless of whether the wheels are designed to run at those speeds or not. For example, in a grinder room consisting of eight units, the normal speed of the wheels was 190 r.p.m. In order to meet that speed especially large grindstones were installed and yet the foreman of that room insisted on running the wheels at 240 r.p.m. When a test was being made at this plant, his attention was called to the appearance of the various tail races. The wheels under test were operated at the best speed and its tail race presented a quiet and undisturbed condition, while all the others were very much disturbed and agitated.

Much could be said concerning the use of available flow in plants having several units. In general, the load should be so proportioned as to get the most power out of the water used. The daily operating head should be kept as high as possible, except for special reasons, such as peak loads or emergency causes. Many plants are continuously run under reduced head from simple lack of attention or plain ignorance on the part of the operator. A good many operators pull the pond or forebay level down the first thing in the morning and then run under these low head conditions the rest of the day, and when asked for the reasons apparently have no real ones.

It may seem that the examples used to illustrate the various shortcomings in water power plants are exaggerated, but they are all taken from actual conditions.

It should also be stated that a large number of water wheels have been tested and found to be up to and above their guarantee. This is especially true of the more modern large units. Within the last few years, several large vertical hydroelectric units under test have shown an over-all efficiency of 90 per cent.

In order to operate existing plants up to their maximum efficiency, more regular attention should be paid to the actual operating conditions of each essential part of the hydraulic layout. Eternal vigilance coupled with common hydraulic horsesense will in a large measure accomplish this purpose.

The aim of this paper was to present facts from actual experience and it is hoped that when these facts are brought to the attention of men interested, they will be of service in helping raise the operating efficiency of existing waterpower plants.

Budget System

By DURWARD EARLE BURCHELL
Professor of Industrial Accounting, Harvard University

Address Before the Cost Association of the Paper Industry on April 13, 1921, at the Waldorf-Astoria Hotel, New York

BUDGET systems are as old as business and probably older. They may not have been called budgets, but have been some plan of pre-determined receipts and disbursements, or if you please, income and expenditures. The budget idea prevails in every division of business where these ideas are worked out in pre-determined studies afterwards compared and checked by actual happenings. Some speak of a budget system as laying out a course for a voyage; others speak of it as designing of a structure by an architect; but in business, the budget not only means the laying out of the course for a voyage or the designing of something to be constructed, but, more than these, it usually means laying out a plan which will not only be accomplished but improved upon as the business itself proceeds. Stakes which are set a year, a month, a weak or a day in advance, are frequently reset because the pre-determined business of the future must be regauged from time to time, on account of past and current events which make it possible to accomplish better results or impossible to accomplish as good; a good business man always plays the game to beat his budget.

The budget systems with which we are all most familiar are those of receipts and disbursements of public and private organizations. In most cases, there is a fixed limitation upon the receipts, and the disbursements must be planned in advance and sub-budgets must be made in order to provide equitably for all activities. The three budget systems best known by other titles are:

Quota budgets, used for setting up pre-determined sales, production, income, earnings, and the like; excellent examples during the war were the drives for Liberty Loans, Red Cross funds, and the like.

Expense budgets are another well known class of budgets bearing upon expenses, disbursements, and some authorities include under this title budget systems in cost accounting.

Financial budgets are the third well known group; applies to working capital, receipts, and any phase which bears upon a study of working capital and financial allotments, in order to pre-determine the financial requirements for future periods.

Each and all of these budget systems are used by well organized business concerns and have been for years. The reason why the budget idea and

budget systems are coming to the front today is because there is so much more to be gained by combining all of the parts into a whole, that is, carrying the budget idea throughout the plan of pre-determined figures and current comparisons, studies, and re-budgeting.

Many concerns apply the budget idea and may have a complete budget system without calling it by name. Just now, budget systems are popular, and everyone is giving them more thought, some announcing with pride and satisfaction that they have been running their business by a budget system for years.

Everyone knows the value of the budget system where it has been used; the thing for us to learn today is how to extend the budget idea and develop in our business a thoroughly and carefully worked out budget system from beginning to end. In order to do this, the first step is a complete analysis and classification of our business and business activities; our sales and production by districts, territory, branches, salesmen, kinds of product, grade, size, finish, etc.; also, our income and earnings may be worked out along the ideas of quota budgets; our problems of working capital, receipts and disbursements may be worked out along the ideas of financial budgets; our expenses along the ideas of activities, divisions, departments and purposes, and, finally, our costs by some accepted and tried plan of cost budgets.

Budget systems in Cost Accounting have been coming into use, value and prominence for several years. Sometimes without a name and sometimes labeled as budget systems of cost accounting. The budget idea prevails in many good cost accounting systems wherever there are pre-determined figures, based upon standard and standard principles, which are afterwards compared and reset on the basis of controlled current costs and cost data; it may be applied to material, labor, and expense, first in the original and apportioned charges and then in the cost of the product based more or less upon normal conditions, normal costs, normal operations, and normal production. A budget may be provided for pre-determining the sales, the cost of sales, the gross profit, the expenses, and these in turn may be sub-divided by sub-classifications and sub-budgets for the different kinds, grades and sizes of the product, the relative cost of each, and, finally, upon the individual profits on the different units of product.

The budget system is applied in pre-determining the cost of operation not only as a whole, but for each division, department, and productive unit of the plant. The number of hours which each productive unit can operate during a long period of time may be pre-determined as a basis of normal time units. As a result of these two sets of predetermined figures a pre-determined rate may be computed for distributing the operating cost, indirect cost, or expense of any productive unit to the product in process according to its routine.

Each of these suggestions of pre-determined figures afford excellent opportunities for developing and using the budget idea and, when constantly controlled, studied, checked, compared and revised by current figures, become most valuable examples of the budget system. It is no more difficult and no more complex for qualified accountants and engineers to set up a thoroughly practical and economical cost accounting system according to the budget idea than without it. Furthermore, when thoroughly worked out it may afford better control, and always a safer and better plan of administration. A good budget system prevents loose ends and indefiniteness; there must be a place for everything and everything in its place; when anything is out of place or anything is too large or too small, it is readily detected and related to the cause. The management has greater assurance that the information is reliable and that explanations are the actual reasons; there is a clearness, definiteness and proof of accuracy which enables the executive to enforce economies, greater and better balanced production, safer selling prices and finer discrimination between profitable and unprofitable product; he knows the units which produce his profits and the causes of his losses.

Say!

A prominent machinery manufacturer who states that he is a "charter member of the Anti-Calamity Howler's League" has issued the following:

"What's the matter with business? ABSOLUTELY NOTHING. The matter is with YOU and I. If YOU NEED the product that I build—THEN BUY IT. IF YOU wait until MY price comes down, do not forget that somebody else is waiting for YOUR price to come down—so where do WE get off?

"The moment that YOU realize and I realize that we are both dependent upon each other and that others are dependent upon both of us, YOU and I will find plenty of business and lots of work to be done. Time and competition will take care of price shortcomings, but to bring about the kind of prosperity that is normal and healthy the thing for YOU and I to do is to get busy. I cannot afford to operate MY plant unless YOU buy MY machinery, and YOU cannot afford to operate YOUR plant unless some one buys YOUR product.

"One little word sums up the whole situation and that little word is **COMMENCE.**

"Loosen up—There's No Pocket In a Shroud."

If the boss pasted a ten-dollar bill on the bulletin board, would you stop and look at it? He pastes a good many hundreds of dollars there every year in the shape of Safety bulletins. Do you read them? asks the National Safety Council.

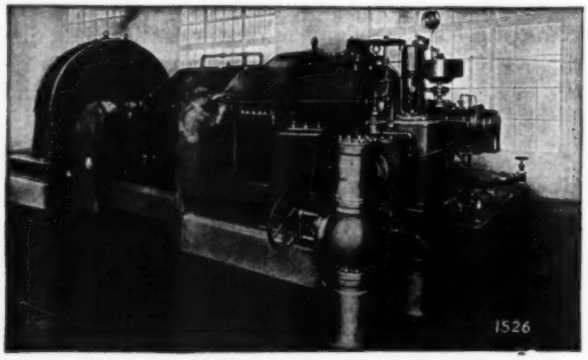
Direct Current for Variable-Speed Sectionalized Paper Machine Drive

By GEO. H. GIBSON

A PAPER machine driven from a single source of power, as a steam engine or prime mover, requires a complicated system of variable speed shafts, cone pulleys and belts in order to take care of the elongation of "draw" of the material as it progresses from pulp to finished paper.

Electric drive by direct current motors offers a ready means for securing speed variations, and in seeking to improve the mechanical drive the idea of driving successive sections of a paper machine by separate direct current motors with an independent controller for each motor naturally presents itself.

The only paper machine as yet in operation using a sectionalized electric drive was recently installed



at Mill K of the Crown Willamette Paper Co., at West Linn, Ore. It was built by Bagley & Seawall, Watertown, N. Y., runs at 1,000 linear feet per minute, and is said to be the largest and fastest machine in existence producing news print.

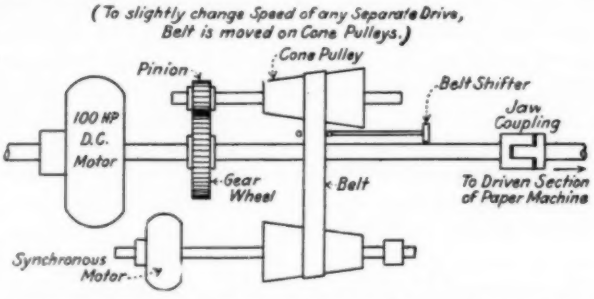
It is driven by nine direct-current motors, one for the couch rolls, four for the same number of press rolls, two for two sections of dryers, one for the calendar stack, and one for the reel. The first eight are rated at 100 h.p. each, at about 100 r.p.m., and the reel motor at 30 h.p., large motors being used to provide the very heavy starting torque due to friction in the bearings and to other causes. These are shunt motors, but are provided with series coils which are cut out after starting.

The current for these direct current motors is supplied by a 600-kw. direct current generator driven through speed-reducing gears at 900 r.p.m. by a De Laval multi-stage geared turbine running at 3600 r.p.m. This unit is exceptionally quiet in operation and runs without vibration. The steam pressure is 175 pounds per square inch with 100°F. superheat, and the exhaust pressure varies 5 to 15 lb. gage. The exhaust steam, amounting to about 10,000 lbs. per hour, is completely used in the dryers, for which purpose it has the advantage of being free of cylinder oil. To dry a pound of paper requires from 3 to 3¾ lbs. of exhaust steam.

The speed of the paper machine as a whole is regulated by regulating the current exciting the main generator, which controls the generator voltage and likewise the speed of all the motors driving the individual sections. For example, with a generator voltage of 160, the machine was driven at 70 linear feet per minute and the different sections required the following amounts of power:

Couch rolls (which drive the wire rolls)	67 h.p.
First press rolls	60 h.p.
Second press rolls	43 h.p.
Third press rolls	43 h.p.
Fourth press rolls	53 h.p.
First section of driers	36 h.p.
Second section of driers	35 h.p.
Calendar stack	60 h.p.
Reel	7 h.p.

The apparatus for handling and distributing the stock on the wire is driven at constant speed by AC induction motors, but succeeding sections of the paper machine are driven by DC motors, the relative speeds of which can be adjusted to take care of the

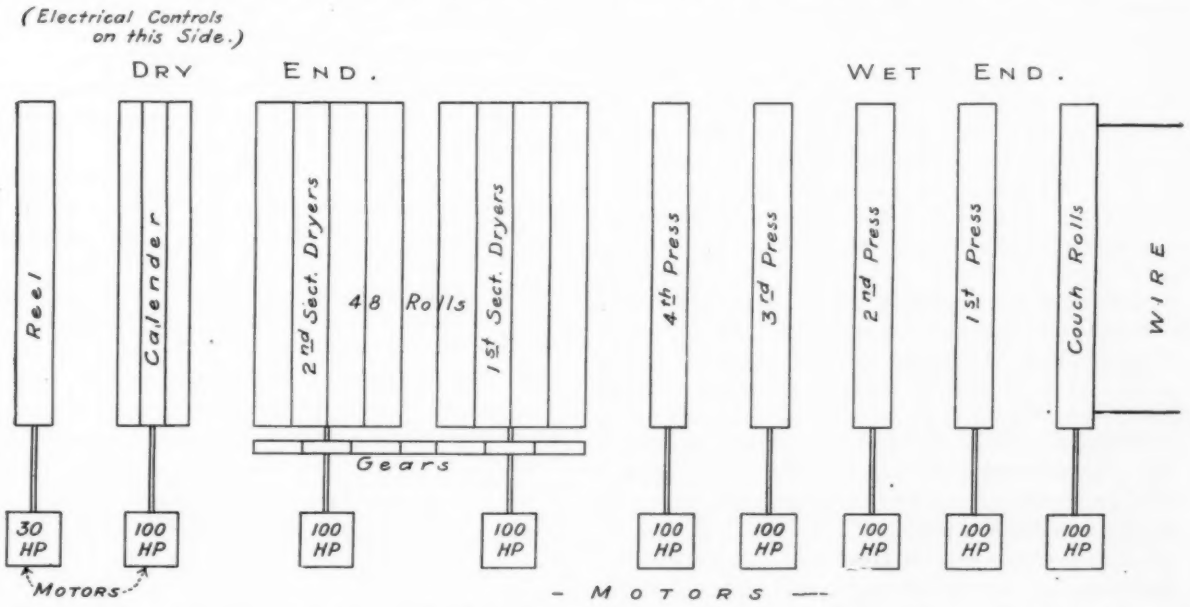


All of the 9 Synchronous Motors comprising the Drive are on Common Bus Bars and are not Connected with any Outside Source of Power. Their Function is to hold all D.C. Motors in Correct Speed Relation. All of the Driving Motors are placed on the same Floor Level with the Paper Machine on its Rear Side. All Controls are on Front Side of the Machine.

"draw" or elongation of the paper as it passes through the machine. The first part so driven is the bottom couch roll which carries and drives the wire upon which the wet stock is first received. Part of the water passes through the meshes of the wire by gravity and the wire then passes over suction boxes, which remove more water, after which it carries the stock between the top and bottom couch rolls, where pressure is applied to expel water and compress the fibres. In this process the paper elongates about 5 per cent.

After passing through the couch roll, the paper is carried by means of felts through four press rolls, which remove more of the water content and further compress the wet sheets. There is a draw of about 1 per cent in each roll, which means that the driving motor must revolve 1 per cent faster than the preceding one.

From the fourth press roll, the paper enters the driers, consisting of two sections, each having 24 canvas-covered cast iron cylinders heated by the exhaust steam from the turbine and by live steam from the boilers, the turbine exhaust not being sufficient. There is about 1 per cent of draw in the driers and also 1 per cent between the last drier and the calendar or polishing rolls, to which the paper passes about 95 per cent dry. From the calendar stack the paper passes to the reel, consisting of a large roll and a smaller roll upon which the paper is wound. The total draw or elongation from the couch to the winder is approximately 9 per cent.



Operation of the Motors

All of the DC motors are separately excited, and their excitations can therefore be increased or decreased to take care of changes in load, as due to changes in pressure on rolls, by adjusting resistances in their field circuits. The starting and stopping of individual DC motors can be accomplished by means of ordinary drum controllers connected to cast-iron resistance grids. Ordinarily they are all brought up to speed together by gradually raising the voltage of the current supply. These methods of speed control alone, however, would not give the rigidity and constancy of speed ratio adjustment required to avoid tearing the paper. In order to hold all of the direct current motors to a rigid speed ratio, each is mechanically connected by a variable-speed transmission to a 20 h.p. synchronous motor designed to run at 800 to 900 r.p.m., and all of the synchronous motors are electrically connected to common bus bars, which do not receive current from any outside source. The synchronous motors must therefore keep in step. The synchronous motors are excited from the same unit that supplies the field of the main DC generator. With this arrangement, if one direct-current motor tends to run faster than the others, the synchronous motor to which it is connected will act as an AC generator. This tends to speed up the other motors, but prevents any alteration in the speed ratios between the direct current motors. At the same time, by shifting the belt of the variable speed transmission, the ratio between the speeds of any motor pair may be regulated with great nicety to take care of the exact amount of draw. The variable speed transmission mechanism consists of two cone pulleys, each 14 inches in diameter at one end and 10 inches in diameter at the other end, and about 4 feet long, with a connecting belt, giving a range of about 12 per cent. The first cone pulley is driven by the direct current motor through a gear wheel and pinion, while the second cone pulley is mounted directly on the shaft of the synchronous motor.

For the production of a uniform product, it is, of course, essential to maintain the speed of the machine as a whole within close limits, as well as to hold a rigid but adjustable ratio between the speeds of the several sections. The De Laval main turbine is therefore equipped with a **Jahns** governor of the oil relay type. For indicating the speed of the turbine, a Fram vibrating reed tachometer is used. It consists of a number of copper-plated steel reeds each attached to a brass block screwed to a bridge-piece, the free ends of the reeds being bent over at right angles and painted white.

Rinman Modification of Sulphite Process

By BRORN. SEGERFELT

Presented at the Sixth Annual Meeting of the Technical Association of the Pulp and Paper Industry, on April 13, 1921, at the Waldorf-Astoria Hotel, New York

FOR many years the engineers in the cellulose industries of Sweden have carried on extensive investigations for the purpose of obtaining an increased amount of by-products from waste liquors. Among the well known men connected with this work may be mentioned Hugo, Wallin, Skström, Prof. Klason, Sandberg, Strehlenert and Rinman.

Up to date Mr. Rinman has met with the greater success. Having had direct connection with the operation of the mills as well as the laboratories has given him excellent opportunities to carry on experimental work. At the beginning of his investigations he was convinced that if the same quality of pulp could be obtained by using caustic soda instead of salt cake he would then have taken a step forward on the road to success. As a result of many years of hard labor he finally devised a method of cooking whereby even better results were obtained by the use of caustic soda than with the salt cake and in his connection with several mills in Germany making pulp from straw, he demonstrated this fact on a commercial scale to the satisfaction of everybody. His methods were later adopted in several sulphate mills in Scotland and Sweden where kraft pulp was being made from wood.

Following are extracts from some of the Rinman patent claims, as well as explanations of the advantages and results from the Rinman process:

(1) A method of producing cellulose by cooking the wood with weak caustic solution with the aid of a reducing material preferably mercury.

(2) That the main operation is done at a temperature not exceeding 170° Cent.

(3) When the cook is finished the pulp is washed in ordinary diffusers and the black liquor passed to evaporators and evaporated to about 35° Bé. at 60° Cent.

(4) To the evaporated black liquor is added a sufficient amount of fresh caustic soda to compensate for losses, also lime is added.

(5) This mixture is now placed in a retort for dry distillation and distilled at not over 500° Cent. In order to obtain the highest yield of acetone, methyl alcohol and oils a small amount of steam is admitted to the retort.

Besides the above mentioned by-products, fuel gases and coke are also obtained. The fuel gases are used direct to heat the retort; the coke is burned in a rotary burner and the ash dissolved in water, the sludge of lime separated and fresh liquor obtained for cooking purposes.

Advantages of the Rinman Method of Pulping

The bad odor is entirely eliminated.

The yield of pulp from the wood is as high or higher when the Rinman method is used than when the ordinary sulphate method is employed and a better quality is obtained.

There will be no hard scales on the heating surfaces of the evaporators or concentrating apparatus because we operate under low temperatures without the use of smelters where silicates are usually separated out.

The loss of alkalies is only about 2 per cent to 3½ per cent of the pulp produced while by the sulphate process 10 to 25 per cent is lost. This great difference is due to the fact that the high temperature in the smelters used in connection with the sulphate process carries a large quantity of the alkalies up through the chimneys.

The lime consumption in the Rinman process is less than in the sulphate, only about 10 per cent of the air-dry pulp being required.

Results from the Rinman Method

At a test made at Gryksbo, Sweden, the following results were obtained:

	RINMAN METHOD	ORDINARY SULPHATE METHOD
Break length	7678 meter	7554 meter
Stretch	4.47 per cent	4.72 per cent
Yield about	50 per cent air-dry	38 per cent air-dry

Bleachability tests made at Skoghalls sulphate mill, Sweden, have shown that a clear white pulp can be made having a bleachability of 15.5 per cent and a yield of 39.3 per cent from bone-dry pulpwood.

The Rinman process is very flexible. It is quite possible to produce any quality of pulp desired simply by varying the cooking.

By-Products Obtained in the Recovery Process

From one ton of pulp (2,240) pounds we obtain approximately the following:

Methyl alcohol	50lb
Acetone	50lb
Oils suitable as substitutes for gasoline	100lb
Heavy oils (boiling point 150° Cent.)	200lb

The wood used in the foregoing tests was similar to the American white pine and jack pine.

By employing the Rinman method in making pulp from straw and grass the approximate yields are as follows:

Methyl alcohol	24lb

Acetone	50lb
Light oils	100lb
Heavy oils and a varying amount of ammonia	200lb

When tropical grasses are used from 10 to 20lb of paraffin is obtained having a melting point of 68° Cent.

The oils usable for the same purpose as gasoline, consist of ethyl methyl ketones, higher alcohols, and ketones and hydrocarbons. The specific gravity of these oils is about 0.81 and owing to this fact this oil has higher efficiency than gasoline, the oils are suitable for the same purposes as gasoline. The oils used in Diesel engines consist mostly of hydrocarbons with a boiling temperature higher than 150° Cent.

Apparatus and Machines

The mechanical equipment for a Rinman recovery plant is in use as pointed out before, in straw mills in Germany, but there is also one mill just starting, manufacturing Rinman kraft pulp from wood. The results from this will not be known until May or June. Also in Scotland one soda pulp mill is being changed to adopt the Rinman method.

The Rinman process is more especially applicable to the soda mills because the entire equipment can with some slight changes be made use of. It is quite evident, however, that even the sulphate mills can adopt this method to great advantage. The bad odors from sulphate mills are generally considered a public nuisance; in fact, instances have occurred where injunctions have been served on mill owners to stop the operation of their mills. But while the writer does not consider this a serious matter he certainly feels that other merits of the Rinman method will warrant the sulphate engineer giving it a most careful investigation.

Pulverized Fuel for Paper Mill Power Plants

By LOREN L. HEBBERD, M. E.

Presented at the Sixth Annual Meeting of the Technical Association of the Pulp and Paper Industry, on April 13, 1921, at the Waldorf-Astoria, New York.

In this paper, an account is given of the development and use of pulverized fuel in large power plants. The advantages and disadvantages of powdered fuel are stated. A description is given of a typical plant and mention made of plants now in operation, with a practical comparison between a stoker-fired boiler plant in a paper mill and a plant of the same kind converted to burn pulverized coal.—Editor.

COAL has been burned in the form of pulverized fuel for a number of years in the various processes requiring a large consumption of coal such as to generate steam in boilers, to heat many kinds of metallurgical furnaces and in the cement industry. Its use in the latter industry was tried in an experimental way at least forty years ago. It was about 1894 that the increasing price of fuel oil led to further experiments and the permanent adoption of pulverized fuel by the Atlas Portland Cement Company. The use in this industry spread so that within ten years, the practice of firing kilns with pulverized fuel became general in cement plants. A considerable and varied use of pulverized fuel in the metallurgical processes, followed rapidly. Some idea of the magnitude of the development is indicated by the fact that in 1916, it was estimated that over 8,000,000 tons of pulverized fuel were used annually in the United States. The present consumption is undoubtedly much greater.

As stated above, the cement industry began to use pulverized fuel on account of lower cost. In the metallurgical uses, the lower cost is an item but the question of very close control to secure quality of product, is much more important. Then, too, quantity, the big demand of American industry showed its influence on the situation. With all of these features favoring the use of pulverized fuel, it is not surprising that inventive genius and continued research have combined to overcome the minor disadvantages and advance the art to a commercial success. It is also not surprising that power plant engineers have striven to share in these advantages which mean cheaper production of power. However, there were some difficulties encountered in boiler practice, of which more will be said later, which held back this development until recent years. Another influence here was that coal could be burned on grates satisfactorily enough under stationary boilers to prevent most engineers from launching into this new field which was then admitted to be still in the experimental stage.

Following closely on the first successful power plant installations of powdered coal of a few years ago, occurred the big increases in the cost of coal, labor and power plant equipment. This increased the interest in the subject and the number of installations so that today it is one of the livest subjects of steam engineering and enough commercial plants are in operation to furnish ample evidence of a wonderful future.

What Happens When Coal Burns?

In an elemental consideration of the subject one might begin with the question, Why pulverize a solid fuel such as coal? The answer lies in what happens when coal burns. This burning is a chemical reaction between the carbon and other combustibles of which coal consists, with oxygen, with a resultant liberation of heat. The chemical reaction called combustion, occurs when the oxygen is brought into contact with

Fig. 1—Lopulco installation at Morris & Co. plant, Oklahoma City

the carbon or other combustibles at the temperature required to ignite them. It, therefore, requires a thorough commingling of the substances to realize the best results. From this it can be seen that the proportion of surface exposed for contact with the air which supplies the oxygen, has a great deal to do with the efficiency of the process. When lumps of coal are burned on a grate, the air passes around and over the particles. To obtain even a reasonably large capacity, it is evident that the air must move very rapidly and following the paths of least resistance, will not be evenly distributed through the fuel bed. In commercial practice it has been found that by supplying a considerable quantity of excess air and with more or less mechanical or manual agitation of the fuel bed, it is possible to obtain a reasonably high average efficiency. The socalled avoidable losses consist of unconsumed combustible and of deviations from the practicable minimum of excess air. Without going into details, it can be easily seen that the ash or noncombustible portion of the coal remains to interfere with successive combustion and presents a more or less serious problem of ash disposal which further reduces the efficiency of the process. The foregoing statements may sound like a condemnation of the mechanical stoker, but are merely a plain expression of the admitted fact that the mechanical stoker, while much better than hand-firing, still has some drawbacks.

In comparison with what is stated above, powdered coal presents a surface area which in proportion to its volume is many times greater than that of the average size particles of coal as burned on grates. For instance a cube of coal one inch on a side has a surface area of 6 sq. inches. This same coal pulverized so that 95 percent will pass through a 100-mesh screen will have a surface area of approximately 30 sq. ft. or an increase of 720 times. It is not practical to burn this powdered coal on a grate because the air for combustion would not penetrate readily through such a compact bed, and for many other reasons. When burned in suspension, it immediately presents ideal conditions to permit rapid and efficient combustion. Each particle is surrounded by the air for combustion and the short time it remains in the furnace is sufficient to burn it completely. It is easy to adjust all conditions as may be desired and equally easy to maintain those conditions indefinitely. The proportion of excess air is determined by the furnace temperature desired or by the maximum temperature which the refractories will stand. The refuse or ash is either deposited in the bottom of the furnace, in the rear chamber of the boiler and base of the chimney or is carried out the chimney by the waste gases. Usually about 30 per cent will deposit in the furnace and 20 per cent in boiler and chimney, leaving 50 per cent unaccounted for which must go out the chimney. The latter figure can be reduced to about 15 per cent if desired, by means of collectors in the breeching. In any case, it does not interefere with the process of combustion. Thus the reason for pulverizing the coal is to deliver it into the furnace in a condition better suited to react or burn and to realize a higher efficiency in the process.

Other advantages beside the high efficiency and simplicity of ash disposal are ease of control to meet even a widely fluctuating load; high capacity; heating surfaces free from soot and slag; minimum draft requirements; low cost for operating labor; and the ability to burn easily and efficiently, the very low grade coals. All of the commercial coals of this country and many from foreign countries have been burned successfully when powdered, and some coals, as for instance, Rhode Island anthracite, lignites and Brazilian coal which were formerly considered of little commercial value, can also be used in the powdered form. Such objectionable characteristics as very high ash and sulphur which make a coal undesirable if not impossible for burning on a grate, make practically no difference if pulverized. The lignites and peat deposits of this country offer a big supply of fuel for a plant equipped to prepare and burn pulverized fuel. The lower cost per ton of such low grade fuels might easily mean an astonishing saving to plants located where high grade fuels are high in price. Also a plant once installed is not limited to certain coals but may use a wide variety and thus take advantage of the cheapest fuel possible as the market fluctuates, even to the extent of burning oil and gas.

Alleged Difficulties in Burning Pulverized Fuel

A good deal has been written in technical papers about the difficulties which have been encountered in attempts to burn pulverized coal under boilers in power plants. In some cases, because of the poor design of the burners and furnaces and preparation of the coal, the experiment did not even result in better efficiency as compared to burning the coal on grates. Then other installations which were more or less successful in thermal efficiency were commercial failures because of excessive cost for preparation of the coal, operating labor and maintenance of machinery and brickwork or because the slagging of the ash caused deposits on the tubes and in the ash pit which were difficult to remove and caused shutdowns. Inability to secure high overload ratings from the boilers was another difficulty. In early installations it was claimed that the coal must be ground to a fineness of at least 90 per cent through a 200-mesh screen, also that it contain at least 30 per cent volatile matter. Today some systems are burning coal efficiently where the fineness is only 75 per cent through a 200-mesh screen. It is also easy to burn coals low in volatile such as anthracite coal.

The biggest lesson learned in the early installations was that a boiler plant presents a problem quite different from a cement kiln or a metallurgical furnace and it is not practical merely to install a burner designed for the latter in any old design of furnace under the former. When engineers realized this fact and began to study the subject, and designed to suit the problems presented, then began the success of pulverized fuel in boiler plants.

A few serious explosions created the opinion that it was impossible to handle powdered coal safely. The liability to explosion is not peculiar to powdered coal as any commercial process, which produces a dusty condition, as for instance a flour mill, is dangerous. A plant using pulverized fuel can be constructed sufficiently dustproof so that with ordinary care and cleanliness in operation, it will be entirely safe. Powdered coal in bulk can be handled with perfect safety and is no more liable to spontaneous combustion than the unprepared coal. More often these so called "explosions" have been fires which were neither caused by the powdered coal nor were they more serious because of it. Any boiler plant constitutes a fire risk regardless of how the boilers are fired. In case a tube blows out the danger is greater with a stoker or hand-fired furnace than with pulverized fuel. In most of the systems now in use, the air for combustion is not mixed with the coal until the coal is in the furnace chamber or just before it enters the furnace. If the coal is not mixed with sufficient air for combustion until it is in the furnace, then it is clear that the only chance of trouble is from the powdered coal which leaks out of the system and is allowed to accumulate and blow around the plant. A powdered coal plant can be kept cleaner and safer than a hand-fired or stoker-fired plant.

Difference in Design of Plants

A plant designed and equipped to burn pulverized fuel is not greatly different from a stoker-fired plant as the addition of the pulverizing equipment is partially offset by the elimination of the mechanical stokers. The two plants are identical so far as the unloading, storage and crushing of the coal is concerned. From this point, the design changes. In the stoker plant, the coal is crushed and delivered to overhead bins for delivery to the stoker hoppers. On the other hand, it goes to the pulverizing plant where it is first dried and then pulverized. The pulverized coal is delivered by a conveyor to small bins at each boiler and finally to the boiler by a mechanical feeder which permits of accurate and close regulation according to the load. This feeder and the burner nozzle are outside of the furnace, in fact, there are no moving or metal parts inside the furnace. This is an important advantage over a stoker which in case of trouble is liable to considerable damage before it can be shut down for repair or even before the trouble is noticed. Also it is important that there are usually two or more complete feeders and burners for each boiler operating in multiple and entirely independent of each other. If one should break down, then the one or more other feeders and burners will continue to operate the boiler with very little loss of capacity and efficiency.

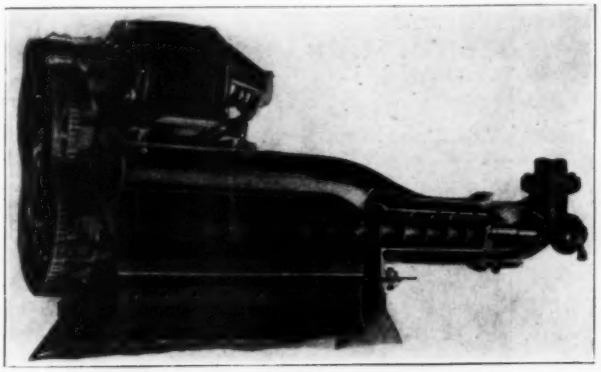


Fig. 2—Lopulco Feeder

Location of Machinery

The machinery required for preparation of the pulverized fuel is sometimes located in a separate and independent building and in other cases, it is part of the boiler house. The plan of using a separate building is favored where a new plant of considerable size is being built and it is possible to design the entire proposition from the ground up. The separate preparation plant may have some disadvantages, but it also has many features to recommend it. In some of the plants where old installations are converted over to use pulverized fuel, more or less of the pre-

paration plant is located in the same building with the boilers.

In any boiler plant, it is desirable to have more or less storage capacity of coal ready for firing. A stoker plant usually has anywhere from two days to a week's supply of coal in overhead bunkers. A powdered coal plant does not store more than about one day's supply of prepared coal, but the total of this along with dried coal and green coal storage in the preparation plant can be made as large as desirable

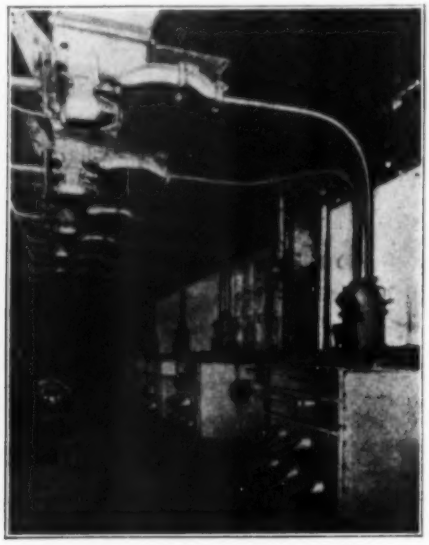


Fig. 3—Lopulco equipped central station

so that the plant is not dependent on deliveries, either by rail or from their outside storage plant for daily operation.

The continuity of service of the preparation plant machinery is taken care of by dividing up the grinder capacity into several units and by sufficient capacity so that it is not necessary to operate twenty-four hours a day to supply the daily requirements of the plant. Thus if three grinders are installed with sufficient capacity to prepare the coal in from twelve to sixteen hours, it is possible to prepare the same amount of coal with two grinders in eighteen to twenty-four hours during periods of repair to one of the grinders.

A pulverized fuel plant may require more handling of the coal by means of conveyors than is usually found in a stoker-fired plant. There my be four or five conveyors involved as compared to only one or two for the latter, but as these preparation plant conveyors are usually short and simple, their cost both for the initial installation and for repairs and maintenance is not very much greater. Where conditions permit, it is entirely feasible to design the plant with the apparatus placed one above another so that most of the conveying is by gravity. This would require only one elevator and one distributing conveyor. One reason why a conveyor in a stoker plant may be quite expensive is because it must handle both coal and ashes. When a pivoted bucket conveyor is used and arranged to run through the basement and up at each end over the coal bunker, it is usually large enough to deliver a day's supply of coal in not over four hours, often in two hours. There is usually only one conveyor of any length in a pulverized fuel plant and that is a screw conveyor to deliver the prepared coal to the hoppers in the boiler house. A screw conveyor, handling powdered coal is simple, reliable and inexpensive as the wear is negligible compared to the wear when handling lump coal. The disposal of ashes in a pulverized fuel plant is very simple and consequently does not always warrant mechanical handling. Some big plants are being designed without ash conveyors and will wheel out the ashes in small industrial cars or wheelbarrows.

The Drying of Coal

One of the biggest and most expensive pieces of machinery in the preparation plant is the dryer. In

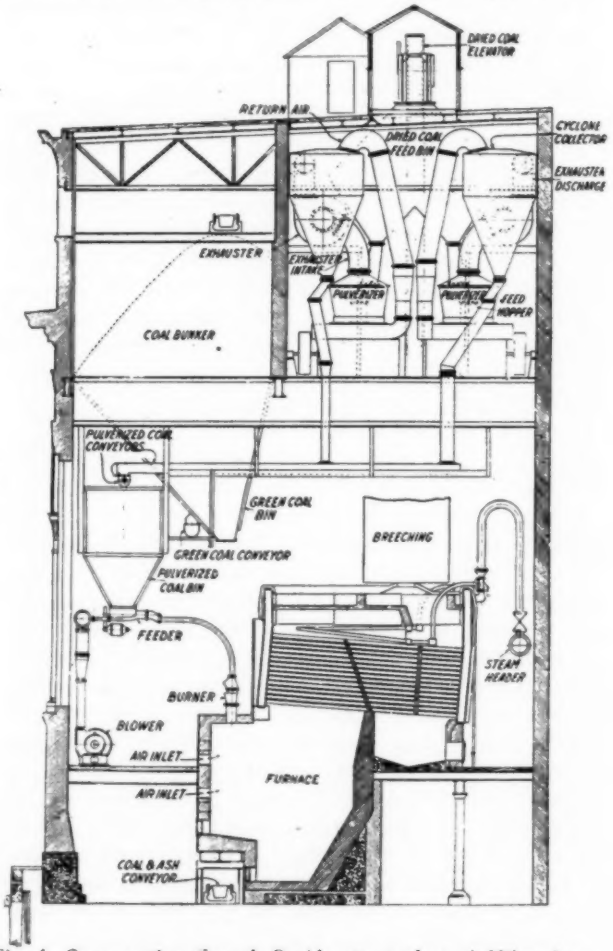


Fig. 4—Cross section through Oneida street plant of Milwaukee Electric Railway & Light Co.

the past, it has been considered necessary to dry the coal down to 1 or 2 per cent of moisture in order properly to pulverize, feed and burn the coal. The latest practice indicates that it is not necessary to have the

coal anywhere near this low percentage of moisture and in some cases, it is possible to operate without using the dryers and to design and install the plant without dryers. The Allegheny Steel Company has operated for three years without dryers and the new Ford Motor Company installation has been built without them. There is no doubt, also, that progress will be made in perfecting the dryers where they are used so as to reduce the cost of installation and operation. There is also the strong possibility of development so as to dry the coal either in steam dryers or by the utilization of waste gases.

The net overall efficiency is about the same whether the moisture is taken out of the coal by pre-drying or whether the moisture is evaporated from the coal in the boiler furnace. There is, if anything, a slight advantage in favor of the latter.

The power required in a pulverized fuel plant is not a great deal more than that required for auxiliaries in a stoker plant equipped with forced draft stokers. The power required to crush the coal and for conveyors will be about the same in either case. The power required to grind the coal, operate the dryers and for the fans where air separation is used, will be at the most only a little more than the power to drive the stokers and the forced draft fan supplying the air to the stokers. The power consumption of the powdered coal feeders is negligible. In some pulverized fuel systems, a large proportion of air for combustion is supplied under pressure while others require only a very small percentage of air to be supplied with fans, with the balance drawn into the furnace by induction. This latter system naturally saves an appreciable amount of auxiliary power over the former.

The total amount of auxiliary power required in a pulverized fuel plant varies according to the system and the size of the installation. Some plants are operating with as low as 20 kilowatts per ton of coal. Where cheap hydroelectric power is available as is usually the case in a paper mill, the cost of preparation of the coal is a small item. If the auxiliary power is supplied by steam-driven units and the exhaust steam is used for heating feed water, heating the building or for drying it will be a relatively small item. The probability of cheap preparation of the coal on account of the aforementioned is one of the reasons why pulverized fuel is attractive for a paper mill.

Considerations Determining Choice of Pulverized Fuel

In addition to the cost of power for preparing the coal, some important considerations determining the selection of pulverized fuel are the cost of the coal, the saving in labor, the capacity factor and the size of the plant. Naturally, the higher the price per ton or per unit of heat value of the coal, the more worth while it is to increase the boiler and furnace efficiency, though it is not necessary that the coal cost be high to make pulverized fuel pay, as some of the largest and best installations in operation are located where coal is comparatively cheap. Where labor is scarce and demands high wages, it must be eliminated as much as possible. The capacity factor, of the ratio between the average load and the peak load, and the size of the plant are important because of their effect on the overhead cost. A small plant running only eight or ten hours a day and with a seasonable load is patently not a paying proposition for pulverized fuel. A plant of 2,000 horsepower or more and operating twenty-four hours a day is about the smallest plant where it would pay to put in pulverized fuel unless some other conditions are especially favorable. The reason for this is the cost of installation for a smaller plant would be practically the same as for a plant of the above named capacity. It is not easy to lay down many rules by which to judge the feasibility of general propositions and it is more difficult to estimate in advance of a careful investigation, what the cost of the installation will be and what net saving will be realized.

There is a general impression that a pulverized fuel plant is tremendously expensive to build but this is not the case. If a specific plant is taken and an analysis made on the basis of stokers and pulverized fuel, including structural as well as equipment cost, from coal car to ash car, on a continuous developed horsepower capacity, there will be but little difference in the capital expenditure required. Carrying this line of reasoning further, a second conclusion will be derived that if firing costs are compared from coal car to ash car, the result will not be far apart as the dryer and pulverizer are the only two steps in preparing fuel that are not practised in modern stoker plants today, and are about offset by the smaller cost of running the firing auxiliaries and the reduced cost of ash disposal.

Most paper mills present extremely favorable conditions on every one of the points mentioned above. They are usually isolated so that coal and labor are high priced. The load is continuous twenty-four hours a day and throughout the year. Fluctuations in load caused by digesters and stopping or starting of paper machines are easily met and high efficiency maintained.

Operating Labor

The operating labor for a pulverized fuel plant, including preparation plant, coal and ash handling will be less than the operating, coal and ash handling labor for a stoker-fired plant. In many cases, the total labor can be cut in half by changing from natural draft stokers to powdered coal. In a comparison of two typical plants, the coal and ash handling labor including the preparation plant will be about the same. One man can operate a comparatively large drying and pulverizing plant and this man will be

offset by less ash handling. In the boiler room a watertender will be required in either case. One fireman a shift will take care of as many boilers on powdered coal as would require from two to six or more firemen operating stokers, depending on the type of stoker and design of the plant. At least three and possibly fifteen or more men a day would be the saving in labor.

Pulverized Coal in Electric Production

The cost for repairs and maintenance of the machinery, stokers and brickwork as compared to all machinery and brickwork of the pulverized fuel plant will be more or less in favor of the latter. A fair average figure for the pulverized fuel plant is six cents per ton of coal, and the stoker plant will be at least as much and may run as high as fifteen cents per ton of coal. These figures will depend to a large extent on the rating at which the boilers are operated and on the type of stoker equipment. John Anderson, chief engineer of power plants of the Milwaukee Electric Railway & Light Company, made the following statement in a paper describing the Oneida street station of the company:

"Commenting for a moment on the maintenance features of such a plant as has been described, it is the writer's belief, based on two years operating experience, that the furnace brickwork in a pulverized fuel installation will stand up equally as well as a stoker installation, with a very great advantage in favor of the former due to the elimination of all iron work in the furnace or anywhere near the high temperature zones of the boiler furnace."

This plant of the Milwaukee Electric Railway & Light Company was the first large installation of powdered coal in a central station and the data on results obtained there are as accurate and comprehensive as any on the subject available. The paper referred to above includes the report of an efficiency test conducted on all of the boilers simultaneously under normal operating conditions and over a period of four days. This test was not an attempt to make maximum efficiencies, but to set a standard as a basis for their bonus system of payments to the firemen. The firing was entirely in the hands of the regular firemen throughout the test. The result was an overall boiler and furnace efficiency of 80.67 per cent. That this plant is a success is further indicated by the fact that this same company has since built a large new station which is equipped entirely for burning powdered coal. As this plant has only been in operation a short time, there is no test data available yet to show what results are being obtained. However, the indications are that this plant will break all existing records for efficiency production of electricity. This means overall net plant efficiency or the number of B.t.u. required in the coal pile to deliver a kilowat to the line.

Other large power plant installations burning powdered coal under stationary boilers are as follows:

Lima Locomotive Works, Lima, O.
Allegheny Steel Company, Brackenridge, Pa.
Morris & Co., Oklahoma City, Okla.
Puget Sound Power & Light Company, Seattle, Wash.
M. K. & T. R. R., Parsons, Kansas.
St. Joseph Lead Company, River Mines, Mo.
Philadelphia Rapid Transit Company, Philadelphia, Pa.

In addition to the above mentioned there is the new plant of the Ford Motor Company at River Rouge, just outside of Detroit. This is a blast furnace plant and the boilers are designed to burn both blast furnace gas and powdered coal, either independently or in combination. These boilers are unique in that they are the largest boilers that have ever been built. They are rated at 2,640 hp. each, based on ten square feet of heating surface per hp. and will operate normally at 250 per cent of rating with a peak load capacity of 400 per cent of rating. Several of the other plants listed above have interesting features. The Puget Sound Power & Light Company uses sludge and other refuse coal from a local coal mine. Morris & Co. have burned Texas lignite and as a result of their experience several plants are now being planned for Texas which will burn this lignite entirely.

Pulverized Fuel in Paper Mill Plant

As the title of this paper indicates, the object is to show by a comparison what can be done with a concrete example in the application of pulverized fuel to a typical paper mill boiler house. The description of pulverized fuel in more or less detail which has preceded may seem like a rather lengthy introduction but is deemed necessary on account of the probable unfamiliarity of most paper mill men with both the process and the progress which has been made to date.

For the purpose of this comparison a typical plant consisting of eight 400 hp. boilers equipped with natural draft stokers and coal and ash handling apparatus is assumed. It is also assumed that the plant has been in operation for a number of years and that records have been kept of the cost of operation, maintenance and repairs. The figures used may not be agreed to by all but if some plants are doing better, there are also many plants which are not doing nearly as well.

The conversion of the old plant will require tearing out the stokers and rebuilding the furnace to burn powdered coal. The new furnace will take up about the same space as that occupied by the old furnace and the basement ash pit. The only other change necessary which is a part of the boiler equipment would be the installation of the powdered coal hoppers and the feeders. As the feeder is usually attached to the bottom of the hopper and as these can

be placed in almost any convenient location there is no serious difficulty likely to be encountered. It is often easier to install pulverized fuel equipment in an old plant than to replace the old stokers with modern stokers to obtain higher capacity and better efficiency.

It has been assumed that overhead coal bunkers are already installed and will naturally include unloading facilities, a crusher and a conveyor to deliver the coal to the bunker. This will probably hold at least several days supply of coal for the plant and can be used as the storage supply of green coal for the preparation plant. If the preparation machinery is located outside of the boiler house, it will be necessary to provide a building and a conveyor to it from the old coal bunker. There will be included in the preparation plant, a small bunker feeding into the dryer and another small bunker for dried coal to permit regulation of the feed to the pulverizers. If a dryer is not required then only one bunker would be installed or possibly individual small hoppers for each pulverizer. This plant would require two or three pulverizer mills depending on the kind of coal to be used, seasonal peak loads and number of hours per day that the preparation plant is run. Finally there will be a fan and collector for each grinder and a conveyor to deliver the prepared coal to the hoppers in the boiler house.

Cost of Installation

The complete installation, including all machinery material, buildings and labor will cost about $150,000 to $175,000 if a dryer is not used and $25,000 to $35,000 additional for including a dryer. This is about as close as the proposition can be estimated without exact data and a layout of the proposed plant.

The saving in labor may best be shown by tabulating the labor expense required to operate the stoker installation and the pulverized fuel equipment. These are shown in Tables I and II respectively as follows:

TABLE I

Boiler House Labor—Stokers

No. of men and duties	No. of man hrs.	Hourly rate	Total cost per day
1 Boiler house foreman on each shift	24	$ .90	$21.60
1 Watertender on each shift	24	.65	15.60
1 Foreman of coal handling	9	.65	5.85
2 Coal handlers on each shift	48	.55	26.40
1 Ash handler on each shift	24	.55	13.20
3 Firemen on each shift..	72	.65	46.80
2 Helpers on each shift..	48	.55	26.40
Totals	249		$155.85
Annual Cost 365 days			$56,885.25

TABLE II

Boiler House Labor—Pulverized Fuel

No. of men and duties	No. of man hrs.	Hourly rate	Total cost per day
1 Boiler house foreman on each shift	24	$ .90	$21.60
1 Watertender on each shift	24	.65	15.60
1 Foreman of coal handling and preparation	9	.65	5.85
2 Coal handlers for two shifts	32	.55	17.60
1 Coal preparation plant operator for two shifts	16	.65	10.40
1 Ash handler for two shifts	16	.55	8.80
1 Fireman on each shift.	24	.65	15.60
Totals	145		$95.45
Annual cost 365 days			$34,839.25

A comparison of these totals shows an annual saving in favor of pulverized fuel of $22,046.00. The saving in labor in maintenance is another large item and will be considered in a comparison of maintenance of the two systems.

The biggest single item of saving will be in the decreased coal consumption. This plant will probably burn at least 72,000 tons of coal per year in the stoker fired plant and at an average boiler and furnace efficiency of 66 per cent. The probable average efficiency of the pulverized fuel would be not less than 77 per cent. The saving in coal would be 10,300 tons a year arrived at by the ratio of 66 to 77 as follows:

$$72{,}000 - \left(72{,}00 \times \frac{66}{77}\right) = 10{,}300$$

If this coal costs $8 a ton f.o.b. the plant and twelve cents a ton for handling, then the annual saving in fuel would be $10{,}300 \times \$8.12 = \$83{,}636.00$. If a cheaper fuel is available which cannot be burned on the stokers, then a still greater saving would be realized. A different cost per ton of coal would mean a proportionately greater or lower total saving.

The item of maintenance cost in a stoker-fired plant may vary considerably in different plants, but a fair average total yearly cost in a plant of the assumed size for labor and material for stokers and brickwork, coal and ash handling equipment would be not less than $8,000.

Items of Cost and Savings

Against these various savings resulting from the use of pulverized fuel, there will be a charge for power to operate the pulverizers and conveyors and for repairs and maintenance. The labor for operation has already been provided for in the operating labor in Table II. The power for crushing and conveying the coal to the green coal storage bins will be prac-

tically the same in either case so no account of it will be made in the calculations. If dryers are installed and operated half of the time, the average power consumption will be not over 21 k.w. hrs. per ton of coal. If current costs one cent per k.w. hr., then the cost of power will be 21 cents. The record of several pulverized fuel plants show a cost per ton of coal, for lubrication, repairs and maintenance of 7¾ cents. Thus the total cost would be 28¾ cents a ton. In addition to this figure, a charge should be made for taxes and insurance which would amount to about ¾ cent a ton, raising the total to 29½ cents. This cost times the total annual coal consumption of 61,700 would equal $18,200.00.

Summing up these various major items of costs and savings in the operation of pulverized fuel as compared to stokers shows a net saving of $95,482.00 as follows in Table III.

TABLE III

Tabulation of Costs and Savings

Labor	$22,046.00
Coal	83,636.00
Stoker plant maintenance	8,000.00
Total savings	$113,682.00
Charges against pulverized fuel	18,200.00
Net savings for pulverized fuel	$95,482.00

This annual saving is approximately a half of the investment necessary to change over an old plant and the improvements will therefore pay for themselves in not over two years. A modern stoker-fired plant can be designed to operate more efficiently as regards both coal and labor than the stoker plant assumed in this comparison, so that the savings will not be as large as the foregoing figures, but at the same time there will not be the heavy investment which is charged to the pulverized fuel in this case. The difference in cost between a new and up-to-date stoker-fired plant and a powdered coal plant will be so little that there will be practically no fixed charges to reduce the savings owing to the higher efficiency of the latter. The conclusion in either case is that the pulverized fuel power plant will show a decidedly cheaper net operating cost in a paper mill.

Accident Hazards in Paper and Pulp Mills

Prepared by the Engineering Section of the National Safety Council

THE accident hazards of the paper and pulp industry are here presented by departments in the order in which the material is handled.

Wood-Yard

Many serious and fatal accidents occur in loading and unloading pulp-wood from cars. Patented safety car stakes have given satisfaction, and their use will largely eliminate the hazards of unloading logs from flat cars.

In unloading box cars, it is important to provide substantial gangplanks with upper surfaces cleated to prevent workmen from slipping. Gangplanks should be securely fastened in place to prevent their slipping from car floor.

Unloading logs by locomotive crane presents serious hazards; the operator and his helpers should be frequently cautioned of the dangers of their work. Helpers should never stand under or near a load, and the crane operator should never hoist the load until all men are in the clear.

As in the stock and storage yards of other industries, it is important to keep material a safe distance from railroad tracks, walks and roadways. This precaution should be carefully observed in piling logs, and to prevent disarrangement, stakes should be used to confine them. No material should be permitted within eight feet from center line of tracks. One or more men should devote their entire time to keeping the stock yard clean and orderly. If all wood and other materials are kept clear of track, accidents in the yard will be less frequent.

In transferring logs by chain conveyor, a safe practice is to place the conveyor so that the direction of conveyor-chain travel is toward the left of workman placing logs on conveyor. If this is impracticable, workmen should be warned to release their grab-hooks from ends of logs before dropping logs into conveyor trough.

In some mills it is customary to transfer the logs to the log deck by cars, the loading being done by a locomotive crane and grab-bucket of the jaw type. Transfer cars not unloaded by crane should be provided with safety stake pockets.

Block Pile

A well constructed foot-walk equipped with hand railing should extend the entire length of all elevated conveyors and stacker booms. The loosening of block piles when frozen in a compact mass presents serious accident hazards. If dynamite is used to loosen the pile, much care should be exercised, and only experienced men should be allowed to handle it.

One of the larger paper mills which is a member of the National Safety Council has developed a safe and effective method of loosening the blocks. A large skew-anchor is dragged across the face of the block pile by the use of a double-drum hoisting engine. The cable attached to the anchor passes through a block suspended on a second cable running the entire length of block pile, and above it. This method of loosening the blocks eliminates the necessity of men working on the frozen pile.

Log Conveyor and Slasher Mill

Haul-ups or conveyors for moving logs from water-run to yard are often necessary. They should be equipped with walk-ways and hand-railings, and the walk-ways should be separated from the conveyor chains by solid partitions to protect workmen if logs become dislodged and roll off onto walk-ways.

Permanent cribs should be constructed in the stream and, together with all pontoons and bridges, should be equipped with guard rails to prevent workmen slipping off into the water. A single rail three feet above the platform will provide sufficient protection without interfering with the work of the men.

Jack ladders used to haul up logs from soaking pond or water-run to slasher mill should have cleated walk-ways on both sides of the conveyors. Heavy sheet steel guards on each side of the jack ladder will prevent logs from getting off onto walk-ways, and will also keep them lined up so they will drop on saw tables in proper position. Where such guards are installed, it is not necessary to place workmen at the top of jack ladders for this purpose.

Where logs are rolled from a log deck onto conveyor for transfer to cutoff or slasher saw, it is of the utmost importance that the operator of the conveyor have a clear view of the log deck and the entire length of conveyor. If it is impossible so to locate the operating levers, a warning gong should be installed and sounded by the operator before starting the conveyor. The gears, sprockets, shafting, belts, etc., operating conveyor and saw table should be enclosed with substantial safeguards.

The sawyer's platform should be protected on the side toward saw table by a heavy wire screen guard; this is particularly necessary at saws of the traveling-table type, as heavy splinters or parts of logs are often thrown by the saws with sufficient force to kill unprotected workmen. Guards should also be installed to prevent workmen coming into contact with saws while cleaning sawdust from beneath the saw table. Logs being sawed should be securely held on the table by an automatic clutch or other means. Workmen should never get on slasher saw table while saws are running.

Wood Room

Vats for soaking logs or pulp-wood should have substantial, close fitting covers, and be so railed off that when covers are removed men cannot fall into vat.

Drum barkers should be equipped with metal sweeps, attached to outside of drum, to keep the enclosing shell swept clear of bark and splinters. To insure against starting when workmen are inside, a positive locking device should be provided for the driving mechanism of every barker. A man caught in a revolving barker is sure to be killed; therefore, extreme caution should be exercised in their use, and every possible protective device installed.

Disc barkers cause many serious and painful injuries to operators. A satisfactory feed and turn-over arrangement for these barkers has been devised, which greatly reduces the hazard. The driving mechanism of all barkers should be completely safeguarded.

Splitters are not generally considered dangerous, yet if the base plates are slippery, accidents are likely to result. The stock rest or plate should have a spiked or non-slip surface to prevent the stock from slipping from under cutter when the impact occurs. At splitters, barkers, and chippers, where stock is fed by hand and may be dropped on the feet of workmen, the wearing of box-toed shoes is recommended by the National Safety Council.

Chipper accidents are caused principally by wood rebounding from the hopper, due to knots or hard places in the wood stock, or more often to uneven wear in the disc knives, which then act like a series of cams and tend to bounce the wood and throw it from the hopper spout. Frequent inspection should be made to determine the amount of wear and make sure that the knives are properly sharpened and adjusted. The bed plates which form the support for wood being chipped, should be of cast steel or chilled iron, and should be frequently examined to see whether they are dangerously worn. The spout or hopper should be extended sufficiently to enclose the entire block.

The operator should stand at one side of spout when feeding the chipper. A screen placed in front of hopper spout will prevent injury to men passing should wood be thrown out. The operating lever should be within easy reach of man feeding the machine.

Sulphite Mill

Many workmen in sulphite mills think that the gas produced in the sulphur burner is not injurious. In the furnace room, sulphurous acid gas is always noticeable. This gas is known to be dangerous if present in large quantities. Authorities differ as to the percentage which will cause permanent injury, but all agree that inhaling the gas causes irritation of the respiratory system, often resulting in throat and lung trouble, and frequently producing digestive disturbances. Adequate ventilation is therefore necessary in sulphur retort burner rooms. If these rooms are in basements, or located where the natural ventilation is inadequate, mechanical ventilation should be installed.

Elevators for hoisting limestone to charging platform of acid towers are often a source of danger. They should be substantially built with a heavy screen top, and enclosed on all sides. The acid tower charging platform should be equipped with railings and toe-boards, and with suitable covers for the charge doors.

In a different process the gas is passed through

tanks of slacked lime, mixed by agitators; here the charging openings of tanks should be equipped with close-fitting covers, preferably operated by means of counterweights. These covers should always be kept closed, except when charging.

When chips become jammed or arched in chip lofts, and do not drop into digester, steam or air jets are often used to break down the arches; at times it may be necessary to get into the chip bin. Whenever a workman enters a chip bin he should be required to use a safety belt.

Sulphuric acid readily attacks all metals except lead; the careful maintenance of digester linings is, therefore, highly important. Periodical inspection of the linings should be made and reported on a standard form; this should show the condition of the shell lining and of all connections, should be signed by the workman making inspection and by the department foreman, and should be kept as a permanent record. Before an inspection is made, the acid fumes should be blown out of the digester and all connections in the steam and acid line closed and locked.

The blow-off valves of digester should be opened slowly, so the blow pipe will expand gradually. The hot liquid, if relieved too fast, may cause the pipe to burst with serious results.

The hand plate on blow-off valve should be left open during the cooking period, until the digester is ready to blow. This will permit any acid which may leak through the valve to run out on floor, and thus not corrode the cast iron blow pipe.

Each digester should be equipped with two pressure gauges, as a precaution against one getting out of order. Operators should be particularly careful not to loosen the head cover while there is any pressure in the shell.

A steam regulator should be installed on each digester. The automatic control of steam thus secured will insure against excess pressure being put in the digester through carelessness of the cook. The regulator should be connected direct to the digester and not in the steam line.

Every digester should be equipped with a pop safety valve as an extra precaution against excess pressure, should the regulator get out of order.

Before opening the blow-off valve the operator should be sure that the blow pit is ready and that all men are in places of safety. It is, therefore, advisable to install a speaking tube or phone connection between the blow-off valve handle and the blow pit platform. To blow the digester when pit is full of stock or water causes a back pressure that may burst the blow pipe. As it is often necessary for blow pit men to make repairs, etc., means for the closest cooperation between these men should be provided.

If small holes are drilled part way through the digester blow pipe, dangerous corrosion in the pipe can be detected; when the inside of pipe has been eaten away by acids, this fact will be shown by leakage at the drill holes. These holes should be about $\frac{1}{16}$ inch in diameter, and drilled at least halfway through the pipe.

Remote control should be provided for operating blow-off valves. This may be done by means of a sprocket chain passing through the floor above, or through a wall into another room, or by extending the valve stem through the floor or wall; the man operating valve is then outside of the room where blow-off valves and pipes are located. Before opening blow-off valve, he should sound a gong to warn anyone who may be in valve room.

Some companies insert a separate gate valve in the line between the blow-off valve and the blow pit. When men enter the pit, this safety valve is closed and locked, so there is no possibility of an accident at the pit from a premature blow-off or a burst connection.

Helmets and respirators should be used, if it becomes necessary for repairmen to enter valve room when filled with acid fumes.

Suspended Scaffolds

Many accidents have resulted from the failure of scaffold ropes or cables which had been exposed to the action of acid. The use of chains to support scaffolds at digesters is advisable, because dangerous corrosion of the chain links may be easily detected. Manila rope or wire cable may appear safe when, in fact, much weakened by the action of acid with which it has come in contact.

Soda Process

The soda process of digesting chips is similar to the sulphite process, except that the liquid used in the digester is an alkali or soda caustic. Concentrated caustic soda causes severe burns wherever it touches the skin; operators exposed to splashing at caustic soda tanks should be furnished safety goggles and rubber gloves. Running water should be near at hand for use, if a workman is splashed with the liquid.

Groundwood Mill

Most accidents in groundwood rooms result from slippery floors and insufficient illumination. Proper floor drainage should be provided for the large quantity of water used in the wood grinding operation.

During the winter months the rooms are often filled with steam from the grinders; this seriously interferes with proper illumination, and workmen are likely to be injured by slipping or by bumping into objects which they cannot see. Grinding rooms should be lighted by high candlepower lights, placed eight or nine feet above the floor, and equipped with enameled reflectors of proper design. The ventilating conditions will largely determine the number and size of lamps necessary.

The doors of grinder pockets should be equipped

with proper catches to hold them open when pockets are being charged. Minor injuries often occur when the doors fall shut on the hands of operators. Exposed shaft ends of grinders and all other parts of moving machinery should be boxed in or properly guarded.

Rag Department

In some mills pulp-wood only is used in the manufacture of paper; in others, old paper and rags are used. Few mechanical hazards are encountered in sorting rooms, but the ventilation should be given careful consideration. This is of special importance in sorting rags and other materials which throw off dust, and in rooms where cutting and rag threshing machines are located. If possible, a separate room should be provided for these machines. Exhaust systems should be provided for these machines. Exhaust systems should be installed over rag-sorting tables and over the cutting and threshing machines.

Substantial guards are necessary for the feeder rolls of rag cutters and for the driving mechanism of threshers, cutters and conveyors.

Steam should be admitted slowly into the bleaching boilers, so the boilers and pipes will expand gradually. A good practice is to heat the bleaching liquor before introducing it into the boiler, as this reduces the possibility of an explosion.

Beater Room

In beater rooms, as in grinding rooms, many accidents result from slippery floors. Drains should be properly located, and floors kept clean and free from obstructions of any kind. Guards over the beater rolls should be substantial enough to resist impact of the bars or knives, should they be thrown out of rolls. Driving gears of beaters, agitators and mixers should be completely enclosed, and driving belts and pulleys should be substantially guarded.

In the operation of large mixers with revolving panels, it is important that the machines be locked in off position when workmen enter the tanks for cleaning or repairing. The large gear and pinion driving agitator blades should be completely covered with a substantial guard. Flexible couplings of mixing engines, Jordans, coupled direct to motor shaft should be enclosed.

Machine Room

Dry, clean floors in machine rooms will contribute materially to safety. Adequate drainage, frequent inspection, and constant attention to condition of floors are important.

Presses and Dryers

The washing of felts while on presses introduces the hazard of workmen being caught between press rolls. In some mills, it is the practice to remove felts for washing (a duplicate felt being kept in reserve) and this method is said to be more economical than washing the felts on the machine. Whenever felts are washed on the machine, they should be pulled out in front of rolls, never behind them. Footboards should be provided, allowing space for the removal of felts.

As the paper passes over the drying rolls, much of the water is driven off in the form of vapor, and, during winter months, there is likely to be a large quantity of steam in the machine room; a good ventilating system and adequate lighting are, therefore, essential for safe and economical operation.

Driving gears at the back of machines should be substantially guarded and equipped with extension oil cups. Steam pipes leading to drying cylinders should be covered, and footboards should be equipped with hand-railings.

Felt carrying rolls on dryers should be at least five inches from dryer rolls if possible. On many existing machines, the felt rolls are quite near the drying rolls; this condition cannot be remedied, but when purchasing new machinery the matter should be given consideration.

The use of a doctor on the first drying roll is considered an advantage by some manufacturers; if no doctor is used, a heavy wire mesh guard should be placed between the press and first roll.

Calenders

The calender stack has been considered the most dangerous machine in paper plants; but efficient doctors, and feeder belts to lead paper over the top roll into the first nip have greatly reduced calender accidents. If properly adjusted doctors are used and no inexperienced men are allowed to work about the calender, few accidents will occur in their operation.

Winding Reels

The operation of winding reels presents serious accident problems. The stack reel, which is more generally used than other types, presents the most serious hazards. When the paper rolls are large, with little space between them, there is grave danger of operators being caught on the nip side and drawn between the rolls.

To eliminate or reduce this hazard, it has been suggested that the winding and unwinding of reels on the same frame be prohibited. The Wisconsin Industrial Commission recommends that the size of rolls be limited, so there will always be a space of at least eight inches between them.

The operation of stack reels may be made entirely safe by changing the direction of rotation of one reel, and thus eliminating the nip. This may be accomplished by crossing the belt of one reel, or (where reels are gear driven) by introducing an idler gear.

With the revolving type of reel this hazard does not arise, since one reel is on the side toward the calender and the other on the side toward the rewinding machine. With this type of reel the operator sometimes goes between the winding reel and the

stationary part of the machine to smooth out the paper. This unsafe practice should be prohibited because of the danger of loose clothing being caught on the revolving rolls.

Rewinding Drums

As rewinding drums are commonly operated, there is a nip between the drum and the paper roll on side toward operator, and many accidents have resulted from this practice. Several types of guards have been designed to eliminate or lessen this hazard; one consists of a board hinged to the cross bar of machine, and resting against the paper roll, thus guarding the in-running side. The board is thrown back when the rolls are to be removed. Another type of guard consists of a semi-circular metal plate around front drum, which operates automatically with the action of the winding shaft.

The safer method of operation for rewinding drums is to change the direction of revolution so that they revolve outward, thus eliminating the nip on the operating side. This can easily be done on most machines by the installation of a rider roll just back of the rear drum. The paper is led under this roll and up over rear drum to winding shaft. Some mill operators say that in winding certain kinds of paper with this method there is not sufficient contact on the large drum to make a solid roll. This should be thoroughly investigated, as the safe method may be made practical if the drums be "ended about," or if their surfaces be differently fluted. In purchasing new equipment, a type of machine should be specified in which the winding drums turn toward the operator.

The practice of winding a cord on core shaft, to cause the paper to reel evenly, is unsafe and should be prohibited. A collar attached to shaft by safety set screws will serve the same purpose and present no danger to operator. An automatically locking collar has been devised for use on winding shafts. Slitter knives require careful adjustment, and some companies provide a stick for this purpose, but its use is often neglected. A safer method is to equip all slitter knives with sheet steel guards, so enclosing the knife that it is almost impossible for the operator's hands to come in contact with the cutting edge.

Super-Calender

Super-calenders are considered less dangerous of operation than calender stacks, and very few are equipped with doctors. The hazards of operating super-calenders are practically the same as with calenders, and there is no apparent reason why these stacks should not be equipped with guards at the in-running side. A small feed belt should also be installed to feed paper over the top roll into first nip.

Winding shafts which receive the paper from the super-calender are often equipped with collars. Only safety set screws should be used in such collars. An automatically locking collar is recommended by the National Safety Council.

Yoke hooks for handling paper rolls should be so designed that rolls slipping on shafts will not endanger the hands of workmen.

Finishing Room

Care is necessary in stacking rolls of paper. Nonskid chucks should always be used, and the use of wooden blocks or other makeshifts, should be prohibited, as serious accidents are likely to occur in finishing and storerooms as a result of stacks spreading.

A board guard should be placed behind the feed rolls of all cutters and slitters, so the paper may be passed through the roll without endangering fingers of operator.

A very satisfactory method on both single and duplex cutters is to counterweight the guard for end gears so that it may be hoisted out of the way for the adjustment and change of gears. Care should be taken that guard is returned to normal position after having been raised.

Care should be exercised in the operation of overhead cranes and air hoists, and loads should never be carried over the heads of workmen. Safe rules for crane operation should be observed.

General

Care of Tools. Wood hooks, pickaroons and all other hand tools should be kept in perfect repair, well pointed and securely fastened to handles. Splintered or cracked handles should be taken out of service at once. With proper inspection and care, and prompt condemnation of improper and faulty tools, accidents from this cause will be largely eliminated.

Housekeeping. Many accidents result from lack of order and cleanliness in plant operation. In a clean, orderly plant the accident record is far better than in those where order is unknown. Some manufacturers delegate the duty of keeping floors and premises in good condition to a special gang of men, and this practice gives excellent results. Waste receivers should be placed at convenient points about the mills; they should have tightly fitting covers and should be marked "FOR WASTE." Workmen soon become accustomed to their use and take pride in keeping the plant clean.

Trucks. Truck equipment is a matter of great importance in every industry and especially so in paper and pulp mills. Paper rolls may be loaded and unloaded with comparative safety, if trucks are equipped with roll-ways which slide into bed frame of truck when not in use. Always chuck truck wheels while loading or unloading, unless a type of truck is used whose wheels may be raised from floor while truck is being loaded. Electric trucks require careful handling and enforcement of rules governing speed and right of way.

Some mills use small trucks (dollies) not equipped with handles. Rolls of paper are tipped over on them, and pushed from one department to another. As there are no handles for pulling the trucks, operators often get on them and ride back for another load. Where this type of truck is in use, it is a simple matter to equip them with folding handles to be used in moving the empty trucks. Riding trucks is a dangerous practice and should be prohibited.

Handling Material. Mechanical equipment is desirable for piling paper pulp or rolls in storerooms, and for loading freight cars. Without such equipment accidents often result from dropping material, overstraining, etc.

Inspection and Guarding. It is generally conceded that no manufacturing plant can be kept in a well guarded and safe condition without periodical inspection. Most of the large industries employ one or more inspectors, who devote their entire time to this work. Usually the inspectors also supervise the construction and installation of machine guards. Better results are accomplished if the safeguarding of all machinery is delegated to a special gang of workmen.

Evaluation of Lime by Causticizing Tests

By CARL MOE
Minnesota and Ontario Paper Company

Report of the Sulphate Pulp Committee Before the Sixth Annual Meeting of the Technical Association of the Pulp and Paper Industry, on April 13, 1921, at the Waldorf-Astoria Hotel, New York

IT IS of importance for the economy of the causticizing process to have some means of evaluating the lime. There are wide variations in causticity, settling time and bulk of sludge in some mills which it seems might be eliminated by proper selection and rational handling of the lime. Martin L. Griffin recommends a miniature causticizing test for evalution of lime by which a weighed quantity of the lime to be tested is boiled for one hour with a weighed quantity of dry soda ash in some excess of the equivalent to the quantity of lime taken. After settling, the ratio of sodium carbonate and sodium hydroxide is determined in the clear liquor by titrating with standardized acid, using phenolphthalein and methyl orange as indicators.*

This principle has been made use of in a tentative evaluation of lime in some laboratory experiments, the procedure and results of which are set forth in this paper.

Experiment I

A solution of 5 grams of sodium carbonate in 180 Cc. of water was brought to boiling in a porcelain dish. Then 2.5 grams of lime was added and the boiling continued for thirty minutes. The solution and precipitate were then transferred to a 250 Cc. volumetric flask. After settling duplicate portions of 50 Cc. of the clear solution were drawn off and titrated with .5123 normal hydrochloric acid (1 Cc. = .02737 Gm. Na_2CO_3) with following result:

Phenolphthalein: 33.2 Cc. and 33.2 Cc.
Methyl orange: 36.45 Cc. and 36.4 Cc.

Experiment II

A solution of 5 grams of sodium carbonate in 800 Cc. of water was brought to boiling in a porcelain casserole. Then 2.5 grams of lime was added and the boiling continued for thirty minutes. The solution and precipitate were then transferred to a 1,000 Cc. volumetric flask. After settling duplicate portions of 200 Cc. of the clear solution were drawn off and titrated with .5123 normal hydrochloric acid (1 Cc. = .02737 Gm. Na_2CO_3) with the following result:

Phenolphthalein 33.2 Cc. and 33.2 Cc.
Methyl orange: 36.5 Cc. and 36.5 Cc.

It will be noticed that the result of Experiments I and II are practically identical, which should indicate that comparative results may be obtained by these methods within a wide variation of concentration. From the titration results of Experiment II it may be calculated that of .999 Gm. of Na_2CO_3 .1806 Gm. was left uncausticized, consequently that .999 — .1806 = .8184 Gm. of Na_2CO_3 was causticized by .5 Gm. of lime. As .5 Gm. of CaO would require theoretically .9453 Gm. Na_2CO_3 for complete causticizing, it may be concluded that the lime in the present case showed

$$\frac{.8184 \times 100}{.9453} = 86.65 \text{ per cent activity.}$$

The lime used contained approximately 93 per cent total CaO, consequently the equilibrium of the reaction under the conditions described is reached with a considerable amount of CaO not acted on.

Further experiments were made along the same lines with another kind of lime varying the time of boiling, also substituting agitation with a mechanical stirrer for boiling. The lime used in the subsequent experiments to be described represented an average sample from a carload of fresh lime, intended for sulphate liquor causticizing. It was rather hard burnt and had the following composition:

	Per Cent
Silica	3.40
Oxides of iron and alumina	1.89
Calcium oxide	84.65
Magnesium oxide	4.97
Ignition loss	4.80

*Paper, XIX, No. 4.

The procedure in all subsequent experiments was as follows: A solution of approximately 5 grams sodium carbonate in 300 Cc. of water was brought to boiling in a covered porcelain casserole, then 2.5 grams of lime was added. After the causticizing process, solution and sludge were rinsed out in a 1,000 Cc. volumetric flask; then 200 Cc. were taken out of the supernatant solution and titrated as previously. The results of the experiments are shown graphically on the accompanying chart with temperature and time plotted.

It will be noticed that by continuous boiling 63.2 per cent of the total amount of lime has been converted to carbonate after thirty minutes and 65.0 per cent after forty-five minutes. One hour's boiling apparently brings forth equilibrium between the reacting bodies under the conditions of the experiments.

In order to ascertain whether agitation alone would produce the same results as boiling, in accordance with results arrived at by Sutermeister[2], the soda solution was first brought to boiling, then the lime was added, the temperature was allowed to drop more or less rapidly and a motor driven agitator was kept in motion for one hour. The percentage of lime acted on by the sodium carbonate after one hour agitation is indicated at the end of the curves underneath the horizontal line on the chart. It will be seen that the rate of the cooling has a very marked influence on the causticity in this particular case. As already mentioned, the lime used appeared to be hard burnt, and it is very likely that a softer burnt lime would have entered into a more complete reaction below the boiling point, if thoroughly agitated.

In proposing the method described in this paper Griffin had in mind adjustment of the amount of lime to employ in the causticizing process. It seems that it might also give an indication of whether the burning has been carried on beyond a point to make a desirable product for causticizing purpose by noting the equilibrium at and below boiling temperature.

"Why We Have a Cost System"

By S. B. COPELAND
Vice-Pres. & Res. Mgr., Eastern Mfg. Co., Bangor, Me.

IN THE management of an industry, such as that of the manufacture of fine paper, where the product goes through many processes in its preparation and where there are many grades and varieties of product, we find a cost department not only a help toward intelligent management but an essential. Without the information which this department produces, long continued successful operation would be a matter of good luck rather than of judgment.

For determination of sales policies and making decisions upon manufacturing problems, the information contained in the following reports compiled by our cost department or based on statistics which are compiled there, are found invaluable.

A. Period Statement of Income, Assets and Liabilities.—As the records of the cost department are tied in the commercial locks of the company, statements of Gross Sales, Cost of Sales, and Net Income, and Assets and Liabilities—which may be relied on—are gotten out for every four-week period. Without controlled cost records, these figures cannot be safely used.

B. Estimated Costs of Paper, and Sales Reports.—Based on detailed records of manufacture and costs of materials and labor, estimates of costs of manufacturing the different grades, sizes and finishes of our product are turned over to the sales department and made use of in determining the prices which should be obtained therefor.

Also, reports are gotten out showing for every four weeks our sales and the loss or gain from sales according to grades and finishes, by customers and by territories. Those reports show which grades and finishes have proven profitable and should be pushed; the result of the business done with each of our customers period after period; and the general areas in which our sales are expending or contracting.

C. Control of Manufacture.—For every four-week period the cost of operating the mill as a whole, and each department in it, in comparison with previous periods, is reported to the mill superintendent and to other executives. These reports are made in detail so that fluctuation in costs of operation and the cause may be quickly ascertained. Costs of manufacture of steam and electric power are also reported in detailed comparative form so that these costs may be maintained as low as possible.

Performance of labor is shown up departmentally by comparative reports of the time taken for the different operations and standard times.

Efficiency of operation or the opposite is also shown up by weekly reports of Skrinkage and Broke, and by records of Broke made by grades.

Wastage may be detected by means of our reports of materials used, showing the record of each period in comparison with previous periods.

We find reports such as outlined necessary for controlling all Mill Expense and maintaining efficiency and for preventing waste and loss of material.

D. Control of Inventories and Purchase of Materials.—Period reports are prepared to show the

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[2]Soda Pulp Manufacturer, p. 3, also Chemistry of Pulp and Paper Making, p. 100.

quantity and value of each inventory of raw material, materials in process of manufacture and finished product. These reports of materials on hand and of materials used assist the purchasing department greatly in preventing the tying up of too much money in inventories, and at the same time in showing up materials which may run out.

These reports are also of value in research work.

E. Control of Cost of Repairs and New Construction.—By means of our cost records we are able to obtain reports of all expenditures for new construction and for repairs in totals and by single jobs.

When repair costs in any department are high, these reports show why; if repair men take too much time for a repair job the foreman of the department charged for the work generally complains about the charge, if no one else does, and the steps are taken to prevent a recurrence; if our indirect costs of doing repair work increase, this also shows, and the amount of money tied up in construction in process is continually brought to the attention of those concerned.

The reports described above show in part why we find a cost system an essential in conducting our business.

The expense of obtaining this information in comparison with the losses that could readily occur because of not having this information we feel is negligible.

Power Plant Management

Economizers and Economizer Practice

By ROBERT JUNE, M. E.

Having completed the series on Ash and Coal Handling Equipment, Mr. June will now treat various other subjects dealing with the power plant. The accompanying article will be followed next month with one, entitled "Bonus System for Boiler Room Employes," and succeeding issues will contain articles on "Principles of Lubrication," "Keeping Books With the Power Plant," etc. It is believed that they will be unusually interesting and of great value to our readers.—Editor.

OF ALL necessary equipment in the boiler room, the economizer has the oldest history, and in many ways the most secure position. It was in 1845 that Edward Green developed economizer design and construction to a point of practical utility, and the apparatus has been in more or less general use ever since. Curiously enough America, with her apparently insatiable demands for industrial efficiency, has never adopted the economizer to anything like the extent which Europe has, nor has she accorded it, when adopted, the degree of appreciation and recognition to which it is entitled on merit.

For the economizer does possess merits, in many ways which we shall discuss, sufficient to recommend it to thousands of power plant operators, whose boiler rooms are not equipped. But before taking up the question of what the economizer does, let us see what it is.

Economizers are of two types:

Integral—Directly connected with the boiler.

Independent—Not directly connected with the boiler.

Figure 1 is a good example of the integral type. The installation, which is to be found at the plant of the Kansas City Light and Power Company, consists of six hundred H.P. B. & W. boilers, with economizers, built of standard drums and tubes of Stirling boilers, super-imposed. The use of Stirling boiler sections saved time in delivery, reduced cost, and at the same time satisfied the requirements imposed by the operating pressure, which was 300 pounds.

Figures II and III (courtesy of Professor Gebhart), illustrate the independent type, as exemplified by the Green Economizer. The Sturtevant economizer, while differing in some details of design and construction, is of the same general type, and need not be separately described—it being understood that superior merit is not assigned to either equipment with reference to the other.

The independent economizer consists of a series of rows of cast iron tubes arranged vertically in sections. The tubes are usually 9 to 10 feet high and 4⅝ inches in diameter. Sections of decreasing width are arranged across the main flue between the boiler and the stack, so that the gases of combustion must pass through the spaces between the tubes on their way to the atmosphere. A by-pass is provided for use when the economizer is down for cleaning or repairs, so that boiler operation need not be interfered with.

Top and bottom headers connect the various rows of tubes, and the headers are, themselves, connected to upper and lower branch pipes. Feed water, on the way to the boiler, is forced through various sections of pipe, beginning near the stack at the point of lowest temperature, and leaving near the entrance to the economizer, at the point of highest temperature.

Without the economizer, the lowest limit to which the temperature of the flue gases leaving the boiler may be reduced, is of course the temperature of steam, which is dependent upon the pressure, as shown in the following table:

Absolute Pressure Lbs. per Sq. In.	Temperature Deg. F.
100	327.6
110	334.5
120	341.0
130	347.1
140	352.8
150	358.2
160	363.4
170	368.3
180	372.0
190	377.4
200	381.7
210	385.8
220	289.8
230	393.6
240	397.3
250	400.9
260	404.4
270	407.8
280	411.1
290	414.3
300	417.4
325	424.8
350	431.8

What the Economizer Does

The economizer takes in feed water at a temperature ranging from 50 degrees F. to 200 degrees F.,

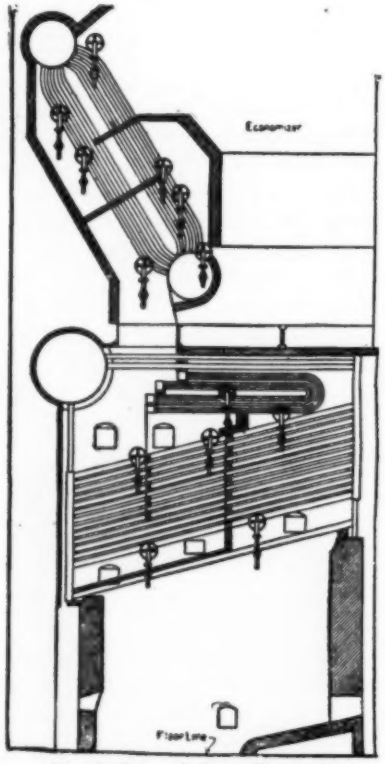

Fig. 1—Integral Type Economizer

and delivers it to the boiler, anywhere from 100 to 150 degrees hotter, utilizing the heat of the flue gases which would otherwise be dispersed up the stack to the atmosphere. Offhand, this looks like an opportunity to effect economies in operation well worth going after.

With the economizer the lowest practical limit is that of the dew point of the exit gases. Under average conditions of boiler operations, only about 85 percent of the possible reduction between initial furnace and outlet gas temperatures can possibly be obtained. To obtain 95 percent it has been calculated that the boiler heating surface would have to be increased by 60 percent. The impracticability of any attempt to gain economy in this manner is evident by a glance at the conditions of combustion.

When the combustion gases first come in contact with the surface of the boiler, the transfer of heat is very rapid, due to the great difference in temperature, but as the gases in their progress become cooler, the rate of transfer declines proportionately. If carried far enough, a point is reached where the amount of heat transferred per square foot of boiler surface is not sufficient to pay interest, maintenance and operational charges upon the surface involved. The calculation to obtain the minimum point is somewhat involved and need not be entered into here. It being sufficient to note that with coal at $3.00 per ton, it ranges from 100 degrees difference between steam temperature and flue gas temperature if boilers are operated 24 hours a day, 365 days a year, to 250 degrees difference if boilers are operated 10 hours a day, 300 days a year. We may assume 150 to 200 degrees difference as a minimum in the average case. This means, finally, that our economical overall boiler efficiency is strictly limited, unless we can find some cheaper means—such as afforded by the economizer —of transferring the heat to the water.

To take an example from actual practice, let us assume that a boiler operating at 180 pounds pressure has been provided with sufficient heating surface, as is often the case, to reduce flue gas temperatures to 560 degrees F. Assume water to enter the economizer at 90 degrees F., that the temperature of exit gases from economizer is 350 degrees F., and water to be heated 150 degrees F. We then have average temperature of gases in the economizer $\frac{560+350}{2}=455$ degrees, and of water $\frac{90+240}{2}=165$, giving an average difference in temperature of water and gases of 290 degrees. This is 1.6 times as great as the difference in temperature between the gases in the last pass of the boiler and the steam. Hence it follows that the economizer surface as a whole will recover 1.6 times as much heat per square foot as will the last square foot of boiler surface.

Advantage and Disadvantage of Economizers

We may tabulate the advantages and disadvantages of the economizers as follows:

1. Fuel—A saving of 5 to 15 percent.

2. Overall Efficiency—A substantial gain where the boilers are forced and mechanical draft is employed. Highest possible gain when boilers are driven 200 percent or more above rating, using me-

chanical draft, and with electrically driven auxiliaries precluding a supply of exhaust steam being available for feed water heating.

3. Decreased strain on boilers, due to higher entering temperature of feed water.

4. Increased Flexibility—Large storage of hot water makes it easier to handle sudden peak loads.

Disadvantages of Economizers Are:

1. Initial Cost—Comparatively high.

2. Maintenance—Comparatively high repair costs due to soot scraper replacements. (This can be eliminated by use of mechanical soot blowers in place of scrapers.)

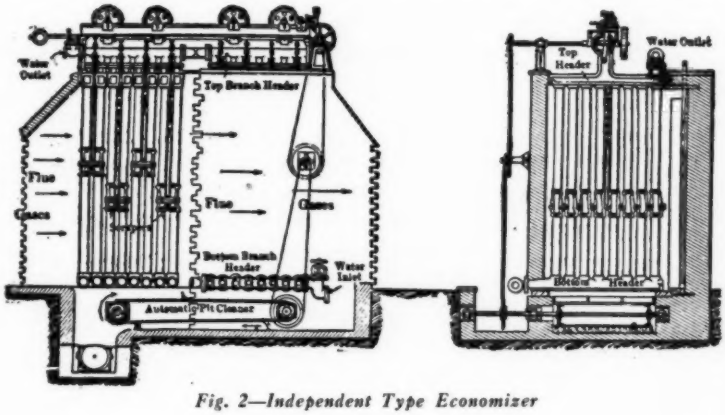

Fig. 2—Independent Type Economizer

3. Overall Efficiency—An actual loss where installation is made in connection with light chimney draft and boilers operating below normal rating.

4. Space Required—The equipment is bulky, taking up considerable space. On new installations, a larger boiler room than otherwise required must be provided; in old boiler rooms, installation can often be made at considerable expense for alterations.

Installation of Economizer

Points to be taken into account when considering the installation of an economizer, are as follows:

A. Flue Gas Temperature — The higher the temperature the greater the economy.

B. Boiler Pressure—If 250 lbs. or over, economizers are indispensable.

C. Boiler Rating—The greater the load on the boiler, the more necessary the economizer.

D. Initial Feed Water Temperature—In some cases an economizer is desirable even with initial temperatures of 200 deg. F.

E. Exhaust Steam—If the use of electrically driven auxiliaries eliminates exhaust steam as a possibility for heating feed water, an economizer is desirable.

F. Purity of Feed Water—With impure feed water, the formation of scale inside the economizer tubes may seriously affect the efficiency of heat transmission.

G. Cost of Producing Draft—If a chimney draft is depended upon, an extra height of stack, costing from 20 to 40 percent will be required. With mechanical draft, power required ranges from one to four percent of main generator out-put.

H. Extra Cost for High Pressure—Cost of installation increases rapidly above 250 lbs. pressure, on account of extra heavy materials required.

Some of the factors entering into successful and economical economizer operation will next be noted.

Gas Temperatures

It is important to know the temperature of the gases entering and leaving the economizer. Either a mercury thermometer or an electric pyrometer will answer the purpose. A recording instrument is preferable, since a permanent record is made to which reference may be made at any time. By means of this record, the losses caused by air infiltration and dirty tubes may be determined at any time.

In inserting the pyrometer tubes, locations at the entrance and exit points of the gases should be carefully chosen. Do not place the tube behind the damper or anywhere else where there is likely to be a pocket of dead gas. Choose a point in the middle of the flue, and be sure that the hole through which the instrument is inserted is sealed tightly about it, so that there will be no air infiltration at this point, with consequent error in records, as well as loss in efficiency.

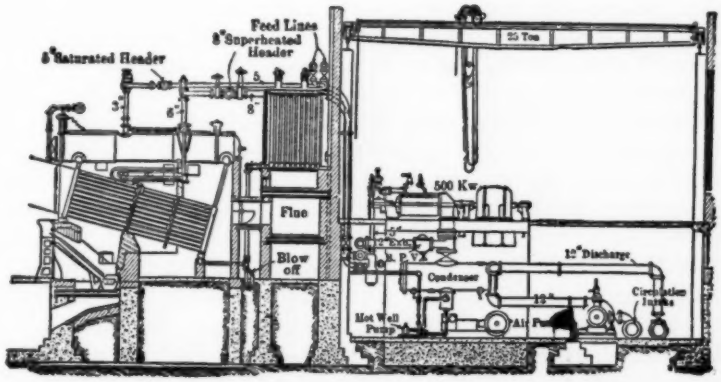

Fig. 3—Location of Independent Type Economizer in Typical Power Plant

Water Temperatures

Mercury thermometers placed in the inlet and outlet pipes will show the water temperatures. Recording thermometers are preferable for the service, both

from the standpoint of accuracy and efficiency of operation.

The function of the economizer is to heat the feed water, and without continuous temperature readings the operator in charge has no idea how well results are being secured. It is not desirable from a mechanical standpoint to operate an economizer under conditions such as would cause steam to form in the economizer, yet this condition might arise with either a slight increase in the temperature, or an increase in the weight of the waste gases passing through the apparatus.

Air Infiltration

Due to the peculiar construction of heaters, dampers, section walls, etc., the economizer offers many opportunities for air infiltration. Frequent checks

Fig. 4—Independent Type Economizer

should, on this account, be made of the entrance and exit temperatures of both gas and water, and frequent analysis should be made of the CO_2 in the entrance and exit gases. A drop of 1 to 2 percent in the CO_2 through the economizer may reasonably be expected, but where the drop exceeds this amount, something is wrong and rigid investigation should be made.

In searching for air leaks, use a torch or candle, paying particular attention to cleaning doors, damper shafts and the walls of the gas flue between the economizer and the boiler. Do not take it for granted that low exit gas temperatures mean efficient economizer operation. Constant checking, particularly of CO_2, is your only safeguard.

How Shall the Economizer Be Cleaned?

This question, until a few years ago, was always answered in one way, as far at least as the independent type of economizer was concerned. The answer given way "by scrapers." This answer is no longer always given, but before considering the alternative, let us examine the "scraper" construction.

Due perhaps to lowered temperatures and slower movement of the gas, there is a great tendency toward soot deposit on economizer tubes. As soot is the best preventative of heat transference known, being several times more effective than asbestos in this respect, it must be removed. In scraper construction, each tube is encircled with a set of triple over-lapping scrapers, which travel continuously up and down the tubes at a slow rate of speed. The apparatus for working the scrapers is placed on top of the economizers, outside the chamber, and the motive power is supplied either by a belt from some convenient shaft or small independent engine or motor. Power required for operating the gearing is approximately one H.P. per 1000 square feet of economizer surface.

Now there are three important disadvantages to the use of scrapers which have led engineers to look elsewhere for a solution of the soot problem in economizers.

These disadvantages are:

(a) Heavy initial cost of scraper mechanisms.

(b) Constant repairs required, due to wearing out of scrapers and other moving parts.

(c) Cost of continuous power to move scrapers.

In addition to these disadvantages, the scraper construction does not permit a thorough cleaning of the tubes. The scrapers embrace two tubes, and clearance is required, consequently there is a certain thickness of soot accumulation which is never scraped off the tubes. Investigations have proved that the scrapers frequently glaze this accumulation into a hard enamel-like scale, that can only be removed by tapping.

As an alternative to the scraper, engineers have been turning in increased numbers to the standard cross-element, revolving type of mechanical soot blower. As far as the integral type of economizer is concerned, the mechanical soot blower has been the only type of cleaning device considered.

Figure 1, which shows the integral type of economizer at the Kansas City Light & Power Company, illustrates the application of mechanical soot blowers for cleaning purposes. Each economizer has six soot blower units, with 19 nozzles each, on each side. Six minutes actual blowing time is required to blow the soot from the economizer, and the steam consumption is about 2600 pounds of steam.

Figure IV shows the adaptation of mechanical soot blowers to the independent type of economizer. With revolving units permanently installed between the tubes and regularly used several times each day, the heat-resisting soot is given no opportunity to collect. The tubes are kept perfectly smooth and clean at all times and consequently the general efficiency of the economizer is very greatly improved.

Where new installations are being considered, it should be remembered that mechanical soot blowers can be installed at the outset, thus entirely eliminating the cost of scrapers. Furthermore, it is possible to plan on the use of horizontal tubes in the economizer, thus permitting the installation of baffles to hold gases in control with tubes for a greater length of time.

Casein

By CLARKE MARION, Chairman

Report of the Committee on Coated and Processed Papers, Before the Sixth Annual Meeting of the Technical Association of the Pulp and Paper Industry, on April 13, 1921, at the Waldorf-Astoria Hotel, New York

THE Committee on Coated and Processed Papers has taken up for consideration at this time a study of casein, which is an article of so much importance in the industry.

Casein is a proteid compound found variously in the animal economy, but especially in milk of which it is the chief constituent. When coagulated by acids or rennet it forms the principal ingredients in cheese. Milk contains between 2.9 percent and 3.5 percent of casein, depending on the source and composition of the milk. The amount that is extracted depends upon the method of precipitation and the amount of washings that the casein requires. Casein is produced by one of three methods, that is, sulphuric, muriatic and lactic precipitation. Each acid gives a casein which has different properties and requires using in somewhat different manner in order to obtain the most desirable results.

The muriatic and sulphuric processes are divided into two classes, depending on whether or not the curd is pressed to expel the excess moisture or whether it is cooked for that purpose.

The general method of preparing muriatic or sulphuric casein is as follows:

The skim milk is heated to a temperature of not over 120 degrees Fahr.; the approximate amount of acid required is then diluted with about four times its quantity of water and added slowly to the milk, with constant agitation. The curd as it forms should be thoroughly worked in the milk in order to expel all of the free acid possible to complete precipitation of the curd with as little excess of acid as is possible. When a complete precipitation of the curd results the whey should be drawn off and the curd well covered with water at a temperature of about 110 degrees Fahr. The curd should then be washed thoroughly in this water by hand, the water drained off as carefully as possible and the curd then put into presses to eliminate as much of the water as is practical.

This refers to the pressed casein. If on the other hand a cooked casein is desired, the wash water is added to the curd, as suggested above, the curds thoroughly stirred into the water and then heated by live steam to a temperature of about 180 degrees Fahr., at which temperature the curds "fuse," so to speak, get very soft and sticky and by their congealing action eliminate much excess of water which they originally possessed. The wash water is then drawn off, the curd cut into reasonably small pieces and allowed to cool and upon cooling the curd is extremely hard and tough and contains only about 50 percent moisture. The curd is then passed through breakers in order to prepare it for the dryers and is dried in a current of dry warm air at a temperature of from 120 to 135 degrees Fahr., depending upon the velocity of the air.

In producing lactic acid casein, this is nearly always done by allowing the lactic acids to develop naturally in the milk. The action is hastened by the addition of a small quantity of starter, or sour milk; when the milk is "set."

The temperature is then raised to 85 degrees Fahr. and maintained at that temperature as nearly as possible until the milk has properly soured or loppered. The best time to retard this souring action is when the loppered milk breaks with a clear fracture from the finger when immersed in milk. The loppered milk should then be heated by means of a steam jacket or by live steam to a temperature of about 130 degrees Fahr., when the curds harden and settle to the bottom of the vat, permitting the whey to be drawn off without loss of curd. If a steam jet is used for heating the loppered milk, care should be exercised not to heat too rapidly as the violent agitation may break the casein up sufficiently to prevent proper separation of the whey. Wash water should then be drawn off the curd as usual and the curd may then be pressed in the usual manner.

The foregoing gives the method of producing the five grades of casein which are most generally known and used for manufacturing purposes. The main differences in the different grades consist of their viscosity when in solution,—the sulphuric and muriatic cooked caseins have the highest viscosity, the muriatic pressed curd is next in viscosity, sulphuric pressed next and the lactic casein the lowest in viscosity. The viscosity above mentioned refers to caseins when all dissolved in the requisite amount of borax for a complete solution. However, each grade of casein yields different results by the use of different alkalies, therefore, a formula should be selected with great care depending upon the grade of casein which it is desirable to use.

There is considerable difference of opinion as to which form of casein gives the best results, that is, requiring the least amount of alkali to dissolve it, having more strength and which spreads better on the coated paper. Undesirable factors may be the result in some cases of not using the correct formula for dissolving the casein. Casein with a higher viscosity is obtained by combinations of soda ash, trisodium

phosphate and borax which give very free flowing solution and sizing of good strength.

On various tests made it was found that the clay carrying capacity as described by Mr. Sutermeister gave the self-soured or lactic acid precipitation caseins first place in strength, while sulphuric was next, sulphuric and muriatic next and muriatic straight as the last. As to distinguishing the different grades of casein, the matter of experience enters into this largely and one experienced in handling and testing casein can usually identify the grade by its general properties when being dissolved.

The viscosity should be taken into consideration, the change of color of the solution as it progresses as well as the increase of viscosity during the process of solution. A simple test, however, as a guide for grading the different samples of casein is to make a water extraction, providing the casein is unalkalied; then testing the water extraction for sulphates and chlorides in the usual manner.

The muriatic caseins show a milky color while going into solution and become thick and stringy when taken between the forefinger and the thumb and rubbed and then spread apart. It will snap off before you have spread your fingers very far apart while the lactic caseins will give a long stretch. In actual operations the amount of casein used per 100 pounds of clay is very marked. The difference between the various kinds of caseins will show a variation in dry pounds ranging from 13½ pounds casein to 100 pounds dry clay to 20 pounds of casein to 100 pounds of clay.

To determine the solubility of casein it is well to try different solvents. There are certain caseins of good quality that no amount of straight borax will dissolve completely. It is well, therefore, to modify the borax test in the following manner: A casein which comes to our attention is first tried for solubility by using 100 grams of casein to 15 grams of borax. If the solution is complete it requires no further test. If it is not complete we make other tests up to and including 18 percent of borax. If this does not effect a complete solution use a combination of borax and soda ash and let the precipitation proceed in the usual way. A casein which will not dissolve completely in 15 percent or even 18 percent of borax usually dissolves in 3 percent of borax and 9 percent of soda ash and yields a casein which dissolves perfectly for a casein generally used in factories where casein is used for various purposes.

In the manufacture of casein the degree of temperature has a direct bearing on the solubility of the casein; washing too has an effect that by having a high fat content will form a saponification and an insoluble residue although it will contain some free acid, but there are caseins which show no trace of free acid, but in the manufacture has been heated too high and thus has given rise to the formation of an insoluble compound. Heating is an extremely important step in the precipitation of casein and great care should be exercised never to heat the milk above 120 degrees Fahr. A somewhat lower temperature at certain seasons of the year is preferable.

Casein is a body of an essentially acid character which is insoluble in water; the addition of alkali however neutralizes the acid and forms a compound which may be considered as a caseinate of the base employed. The caseinates of ammonium, sodium, potassium and lithium are soluble, while those of the heavy metals are not, but since the latter do not come into consideration in the coating industry and since for reasons of expense lithium and potassium are never employed we are concerned almost entirely with solutions prepared with ammonia or some of the compounds of sodium. Of the latter the following have been proposed and used from time to time: silicate, sulphite, phosphates, hydroxide, carbonate, borate, etc., but while the phosphates, carbonate and borate are still very generally used the other three are not commonly employed. As a standard solvent for use in testing we have then the choice of four alkalis but because of the difficulty of handling ammonia and of keeping it at a definite strength it is practically debarred. Of the three sodium salts the carbonate has the disadvantage of causing much foam which necessitates extra care in making the test while the other two are easily obtained of good purity and are of about equal solvent power. There is really very little to choose between these two, but since borax has been for a good many years the alkali most used in soluability tests there seems to be no good reason for changing now.

Solubility

The sample of casein should be ground so that it will all pass a 20-mesh sieve and after grinding the entire sample is thoroughly mixed. Of this ground casein 100 parts is mixed with 400 parts of water and 15 parts of commercial borax and the mixture heated and stirred till solution has taken place. In making this test the following precautions should be observed: at least 50 grams of casein shall be taken for each test; the heating must be by means of a steam or water bath and blowing live steam directly into the mixture should not be practiced; the temperature at which the solution is made shall not exceed 180 degrees Fahr., nor the time of stirring ten minutes. A casein to fulfill this test must give such a complete solution that no undissolved particles are observed when the solution is stirred in a glass vessel or when a clean knife blade is dipped to the very bottom of the solution and then withdrawn. Nearly all of the high grade caseins of the present day will pass this test, though as noted above there is an occasional lot which requires slightly more alkali. There is also another class of caseins which, when tested in this way, show a little insoluble residue, generally in the form of white flakes which may or may not dissolve on further heating or the addition of a little more alkali. The

acceptance or rejection of a casein of this class depends on the particular purpose for which it is to be used and on the judgment and experience of the one in charge of the tests and no general rule can be laid down to follow in all cases.

Strength

The next quality to be considered in judging a casein is its strength. As stated above the purpose of the casein is simply to make the clay, or other mineral matter, adhere to the surface of the paper so that its strength may be stated as the amount of casein required to make a given amount of clay adhere so firmly to the paper that it would not be removed by ordinary printing processes. By many the strength of a casein has been considered to be proportional to the thickness of the solution or to the firmness of the so called "jelly" formed when the solution is cold. Still others judge by the length of threads formed when the solution is pressed between the thumb and finger and then pulled apart; that which gives the longest threads being considered the strongest. Many careful comparisons have failed to establish any definite relationship between such tests and the actual amount of casein used in practice so that a more rational method is desired.

One hundred grams of clay, which has been dried at 100 degrees Cent. are weighed out into a thick-walled porcelain cup, 70 Cc. of water are added and the cup set to one side to allow the water to saturate the clay. While this is taking place 50 Gm. of casein are weighed into a tarred beaker, 190 to 200 Cc. of water are added and then the amount of alkali which has been found to give a complete solution is stirred in and the solution completed by heating on a steam bath. If 200 Cc. of water, or a little less, are used the completed solution will weigh a little less than 250 Gm. and it should then be brought up to this weight by adding hot water so that each gram of casein is represented by 5 Gm. of solution. The clay and water are next thoroughly worked up to a smooth paste by means of a copper rod which has been flattened into spatula form for a distance of about three inches and which has had the flattened end turned over nearly at right angles to enable it to work out lumps which may settle on the bottom of the cup. The cup, clay and copper spatula are weighed and then enough of the casein solution (30 Gms.) poured in to equal 6 Gm. dry casein. This is then mixed thoroughly with the clay and a thin coating applied to a small sheet of paper which is marked 6 and put to one side to dry. The cup and its contents are once more balanced up and 5 Gm. more solution added and mixed in; the sheet spread with this is marked 7. This process is repeated till the amount of casein reaches 11 parts for the original 100 parts of clay, and unless the casein shows unmistakable signs of poor manufacture or subsequent deterioration it is seldom necessary to carry it further.

In spreading the sheets for this test a brush may be used but it has been found more convenient to apply the coating by means of a thin steel scraper which is made from an old saw and bent into an arc so that it may be held in the hand and drawn across the paper with its surface nearly parallel to the latter. The edge of this scraper must be ground perfectly true and smoothly polished so that it may not leave scratches, it should also be as light as possible, otherwise it will be difficult to regulate the amount of coating applied. When using this scraper the paper should be supported by a perfectly flat surface, such as a machined brass plate, so that the coating may be applied uniformly.

When the individual test sheets are thoroughly dried they are inspected and two positions selected on each in which the coating appears of a uniform thickness on looking through it at a strong light. After marking these positions a short stick of sealing wax is melted on one end, applied to the paper with a moderately firm pressure and allowed to stay till fully cold. The melting of the wax may be done by means of a gas flame if care is used that it does not burn, but a better way is to make a copper box with a flat top which can be heated by blowing steam into it and to stand the pieces of wax on end on this box till they are sufficiently melted to adhere to the paper.

When the wax is cold the paper is held down firmly by a finger on either side of the wax and the latter is removed by a steady vertical pull. If sufficient casein were used the surface of the wax will be covered with a thin coating of clay but no fiber; when enough casein is present the fibers of the paper will be found adhering to the wax to the very edge, while at the transition point between weak and strong the wax will show fibers in the centre, but an edge which is bare except for clay. A characteristic record for a casein of good grade would be about as follows:

6 Gm. per 100 of clay—Clay but no fiber adheres to wax; too weak.

7 Gm. per 100 of clay—Fiber in center but clay only on edges; transition point.

8 Gm. per 100 of clay—Fiber adheres over full surface; strong enough. This casein would be said to be strong enough with between 7 and 8 parts per 100 of clay.

In interpreting this test it must be remembered that it does not mean that in practice 7 to 8 pounds of casein will hold 100 pounds of clay and give a coating which will print without picking, for it is found that owing to the different conditions in coating paper on a large scale, a much larger amount will be required. It has, however, been demonstrated repeatedly that the strengths as shown in the laboratory tests are directly proportional to the amounts which it is found necessary to use in actual work, so that if one casein tests 8 parts and another 10 parts per 100 of clay in the laboratory it is perfectly safe to say that the manufacturer of coated paper will have to use more of the latter than of the former to produce

the same result. It is on this basis, as a strictly comparative test, that the method justifies itself.

In performing this strength test a number of precautions must be observed, since if they are not, the value of the test, even in a comparative way, is very slight. It has been found that the quality and fineness of the clay used exerts a remarkable influence on the test, the finer clays requiring much more casein than those of coarser texture. This necessitates keeping a supply of clay on hand and before this is gone selecting another sample by comparison with the first so that it may be certain the new gives the same test as the old. This is not always an easy task and it is sometimes necessary to make strength tests with the same casein on a half dozen different samples of clay before the proper supply can be secured. This same method of testing has to be applied to the paper used when the old supply runs out, only in this case both the casein and clay are the same and the paper to which they are applied varies. The causes which make the papers differ in the amount of casein required to hold clay on their surfaces are not entirely known but some of the contributory causes are variations in sizing, surface finish, and the beating of the fibers. Even with a knowledge of the way in which these factors influence the results it is not always possible to tell what a given sample of paper will do so that the only satisfactory way is to make a practical trial. Another point to which attention must be paid is the thickness of the coating applied, as this has considerable influence on the wax test. It is often found that the thicker portions of the coating will give a much lower strength than the thin parts on the same sheet and this is the reason for the careful selection of points of uniform thickness when applying the wax. There are undoubtedly other factors which exert some influence over this test but these three are the most important and if the precautions noted above are carefully observed he test will give concordant results.

Moisture

Commercial caseins contain on an average about 9.64 percent moisture and the maximum should not be over 12.3 percent. If much more than this is present the casein is very difficult to grind as it is more or less elastic and therefore resists crushing. This tends to set a practical limit to the amount of moisture which can be left on drying a casein and intentional moistening as a means of increasing the weight is probably never practiced because of the danger of the casein spoiling subsequently.

The most common procedure is to dry a sample at 100 to 105 degrees Cent. and if this temperature is maintained for 2½ to 3 hours the weight will be practically constant. A long series of tests showed that different caseins do not behave in exactly the same way on drying but in general it may be said that sufficient decomposition of the casein to cause an appreciable error does not occur below 115 to 120 degrees Cent. and that exposure to 105 degrees Cent. for as long as 18 to 20 hours does not interfere with the results.

Color and Odor

A good casein should have a clean, pleasant odor and should be neither moldy, musty nor rancid. The color should be light yellow or cream and there should be no dark brown portions or black specks. Bright orange particles indicate that the casein has been burned in drying.

Acidity

Weigh into a clean beaker 20 Gm. casein. Measure into breaker 100 Cc. hot distilled water, stir well and filter into another beaker keeping as much of solid casein in first beaker as possible. Repeat washings four times, each with 100 Cc. of hot distilled water, collecting all washings with same beaker. Bring volume of washings up to 500 Cc. Divide into two portions of 250 Cc. each and titrate with fifth normal NaOH using phenolphthalein as an indicator.

Insoluble Matter

Let the above solution settle one hour. Decant (saving the solution) and to the lumps in the bottom of the beaker add 50 Cc. water, stir and decant. Repeat once, then dry at not over 105 degrees Fahr. and weigh. Microscopic examination should be made to determine its source.

Ash

Weigh 5 Gm. into a porcelain dish and ignite until ash is white or grayish white (casein must not be ashed in platinum as it attacks the metal). Cool in desiccator.

Alkali

Add about 5 Cc. distilled water to the ash and warm. Then add 1 to 2 drops phenolphthalein. If the ash is alkaline, titrate it with tenth normal HCl. Ash of pure casein should not be alkaline to phenolpthalein or to methyl orange. If it shows alkalinity it should be treated qualitatively for borax, Na_2CO_3, and sodium phosphate and calculate the titration to Na_2O.

Starch

Warm a portion of the sample with distilled water. Cool and add a few drops very dilute iodine solution. Blue color indicates starch. If added alkali has been found in the casein, make solution slightly acid before adding iodine solution.

Viscosity

Make up mixture using same percentages of ingredients as in mill mixture. Use 100 Gm. of casein in mixture. Cook to 145 degrees Fahr. for fifteen minutes and cool to 80 degrees Fahr. Place mix in cup of Mac Michel viscosimeter and determine viscosity.

Grease

Weigh out about 5 Gm. of casein into a dried extraction thimble and extract in Soxhlet apparatus with ether. Extract four times. Dry, weigh and report loss as percent fat.

The New Hall Process of Grinding Pulp

By W. A. MUNRO, Chairman

Report of the Groundwood Committee Before the Sixth Annual Meeting of the Technical Association of the Pulp and Paper Industry, on April 13, 1921, at the Waldorf-Astoria Hotel, New York

THE Groundwood Committee has investigated a subject, "The Hall Process of Grinding Wood," that has marked one of the greatest steps forward in the scientific manufacture of groundwood pulp. This process is known to some extent by all groundwood pulp manufacturers; some have a clear conception of what it accomplishes, while others have but a hazy idea of the subject and no definite working knowledge of it.

The Groundwood Committee has based the material and the statistics in this report entirely on a questionnaire sent to the mills operating under this process, and has endeavored to present the subject from three angles, that of the grinder room, the paper machine room and the press room.

So far as we can discover, any effort to improve groundwood, or the methods of making groundwood, that can be connected with this process, dates back only to 1914. To be sure there were spasmodic efforts made in this direction from time to time, but until that year there appeared no one with sufficient zeal or initiative to inaugurate a sufficiently broad series of experiments to insure the finding of the "Better Way," if such a way were in existence. The first thought along this line concerned the preparation of the wood to be ground, and a tank was rigged up for the purpose of steaming or boiling it before grinding, and at the same time a great deal of thought was given to the subject of various types of burr, and the influence of certain burrs on the quality of the pulp, particularly with respect to the fiber length.

It may be of interest to note that the suggestion to groove the stone came first in an entirely accidental manner. It was observed one day that certain of the pulp-grinding stones, as they came from the quarry, were dressed differently from the others. This dress, evidently put on by a tool working across the face of the stone and parallel to the shaft on which the stone would be hung, seemed to leave the face of the stone in the shape of flat-topped ridges, and from this suggestion there eventually worked out a burr, the action of which was to shape these ridges, and to separate them by grooves. In actual practice it was found that these grooves performed a most important function, namely, that of providing a recess in which pulp ground under one pocket could escape regrinding under the other succeeding pockets, thus preserving intact the particles of fiber so necessary to the formation of a perfect sheet of paper.

With these two ideas co-ordinating, namely, the preparation of the wood by boiling and the use of a marker or grooving burr crossed with an 8-cut spiral burr, the first working experiment was made at the mill of the St. Regis Paper Company in September, 1914, with the result that about twenty-five tons of paper were made without the addition of sulphite to the groundwood. This pulp ran well on the machines and had a good pop test. That it ran equally well on the presses is attested by the fact that it went through without any criticism, and it will be remembered that in 1914 publishers were not inclined to withhold criticism where it was thought due. It was found, however, that the additional labor involved, the expense of live steam, etc., rendered the boiling process too expensive; that even though sulphite could be dispensed with wholly or in part, there was no important money saving effected, so the practice of boiling the wood was discontinued, and attention turned wholly to the grinding of the raw wood, keeping in mind the fundamental idea of preserving the fiber length as much as possible. This practice proved so successful that important reductions were made possible in the amount of sulphite used.

About this time important changes in the control of the St. Regis Company had the effect of transferring the field of experiment to the Taggart Mills, owned and operated by the late Mr. George C. Sherman. Here the same general effect followed the introduction of the burrs and practice inaugurated at the St. Regis mill.

Soon after, these burrs and their system of operation were introduced into several other mills which we will designate as Nos. 1, 2, 3, etc.

No. 1. Here the demonstrator used the ¾ marker and crossed it with an 8-cut spiral.

No. 2. Used ¾ marker and the 8-cut spiral, but determined to dispense with the marker temporarily, using instead of the marker a 14-diamond.

No. 3. The same as No. 2. From this point on the marker and the diamond were generally used. It was found afterwards that a more even grade resulted from the use of the No. 4 marker and the diamond than from the spiral burrs.

Production Increased

To obtain the largest possible amount of real usable fiber from each block of wood should be the aim of every progressive pulpmaker. When he has accomplished as much as he can along this line he can still strive to obtain the maximum production from each stone, from the horsepower available, and from each dollar of payroll.

The Hall process enables the pulpmaker to approach the first goal closely. He can keep the surface of each grindstone in such a condition that a very large part of its surface is in active grinding condition. He can also keep this grinding surface smooth, thereby eliminating the production of slivers. Still further he can keep this smooth surface open and free from glazed spots, thus eliminating the production of very short, fine fibers or flour. In this way the two sources of loss are controlled and the result is a close approach to the largest possible yield of pulp from the wood used.

From another point of view, the paper machine can be run faster and safer with this pulp than with pulp that is constantly varying in freeness over wide ranges. The sheet made from this pulp is easy to press out and consequently easy to dry. The supplying of the paper machine with more uniform stock cuts down the number of adjustments that the machine tender has to make to meet varying stock conditions. This permits him to pay more attention to the mechanical condition of his machine, which is very necessary in these days of running machines much above the speeds for which they were designed.

The grinder room is the only place affected when installing the Hall process, and here only a few changes are required, such as raising the stock dam to deepen the stock pit, and equipping the grinders with a doctor board to prevent the stock from being carried around with the stone. There is no need to change the original layout of the groundwood mill. The dressing put on the surface of the stone is the most important feature of the process, as this is what does most to produce the long, strong and uniform fiber desired.

First of all, the pulp stone is trued up until it is perfectly round and free from sand holes or other imperfections. Then the pattern is applied by means of a special flat bottom burr and a diamond burr. A heavy impression is never put on the stone, light and frequent dressings being the rule. No fixed schedule is worked out, each stone being studied for its hardness and ability to retain its pattern and sharpened when necessary. Not more than a fifth of all stones are sharpened at one time.

Saving of Sulphite

It was found by your committee that the effect of the Hall process varied with different mills, but all reported that this process produced beneficial results. The degree of success depends entirely on the man in charge of the groundwood mill and how closely he watches the stones and the resultant pulp.

One mill reported a saving of 50 per cent in the amount of sulphite used. They had formerly used 27 per cent, and under this process they were using but 13 per cent. They also reported an increased grinder room production and a greater yield from a cord of wood.

Another mill reported a saving in sulphite of 25 per cent and an increase in paper machine production.

Another mill claimed that by running their grinder room under this process, they could grind wood with an expenditure of but 54 horsepower to a ton and could use but 14 per cent of sulphite on their paper machines.

Still another informed your committee that they could run for weeks on a wholly groundwood sheet and that their per cent of sulphite never ran above 6.

The installation of this process by mills using groundwood in either small or large proportions in the manufacture of paper would increase materially the amount of paper from a cord of wood, and in that way conserve the stumpage of this country and lessen the amount of cut needed to supply our mills.

This saving in wood or stumpage is accomplished in two ways: First, by decreasing the use of sulphite, which takes approximately two cords of wood to each ton of pulp produced, or more than twice as much wood as is needed to produce a ton of mechanical pulp. Secondly, by obtaining a higher yield from a cord of wood under this process than by any other system or process.

In the case of the reduction in the amount of sulphite, and the consequent saving in wood, a 100-ton newsprint mill formerly used 25 tons of sulphite daily or 50 cords of wood. The use of this process cut the sulphite consumption in half. As a result only 25 cords of wood were needed to make the required amount of sulphite.

The groundwood mill formerly had a yield of 2,100 pounds to the cord (rossed) and 1,820 pounds to the rough cord. After installing this process the yield was 2,350 pounds to the rossed cord and 2,000 pounds to the rough cord.

Wood used before installing this process:
50 cords to make 25 tons sulphite.
83 cords to make 75 tons groundwood.
133 cords used in manufacture.

Wood used under the Hall process:
25 cords to make 12½ tons sulphite.
88 cords to make 88 tons of groundwood.
113 cords used in manufacture.

This saving of 20 cords a day amounted to over 6,000 cords in the course of a year and comprised 15 per cent of the company's total cut.

Besides this saving in wood, there are several other factors that add to its value. First, there is a slower depreciation of the woodlands. Second, there is less labor cost per ton, due to the smaller amount of wood to be handled. Third, greater grinder room production with the same equipment and horsepower.

However much these might amount to, the greatest saving or the ultimate effect of the process would be, that every seventh year the mill could be operated without any expense for wood.

The reduction in sulphite by the substitution of

this groundwood does not reduce the quality of the paper in any way; rather it seems to improve its running qualities on the presses. There are a number of press-room superintendents who express a preference for paper made under this process with a low per cent sulphite.

One has informed your committee that the paper received at their press rooms made under this process ran better than the usual run of paper. It had a better finish, took ink better, was stronger, and had more stretch.

Another expressed himself as follows: "We have during the past year and a half used in our press rooms considerable paper made under the Hall process and can say that the results obtained in regard to the running, printing and general service of this paper have been satisfactory in every way. In fact it has been much more satisfactory than some of the paper which is made according to the regular standards of grinding wood and using sulphite as carried on in most of the newsprint mills in the country."

It is of the utmost importance in the Hall process of making groundwood, that the process be watched closely; when this is attended to, the results obtained in making paper when the stock goes to the machines are very satisfactory, indeed, from the press-room standpoint. If the press rooms through the country could have paper made under the Hall process, with the system carried out correctly, and other conditions being right, the results would be satisfactory to publishers in general.

A Simple Moisture Content Indicator for Paper

By C. B. THWING, Ph.D.

Presented at the Sixth Annual Meeting of the Technical Association of the Pulp and Paper Industry on April 13, 1921, at the Waldorf-Astoria Hotel, New York.

THE difference in strength of paper as measured by the same instrument on a very dry day and on a very damp day differs easily by 40 per cent. Now that we have in the Elmendorf tearing tester an instrument which measures the strength of paper with a dependable accuracy of 1 per cent, it is high time to provide an easy and convenient means of knowing quickly and accurately the moisture content of the samples of paper that are being tested. Only in this way can we compare measurements made on different days.

In laboratories provided with moisture conditioning devices and humidity measuring devices, measurements showing the variations in strength with relative humidity of the air have been made. Needless to say few laboratories are so equipped, while thousands of tests are made daily which ignore moisture conditions.

Fortunately the problem is simplified by the fact that we do not need to know the relative nor the absolute humidity of the air. What we require is the percentage of moisture contained in the sample. This may be known quickly without touching the sample if we know the moisture content of a comparison sample hanging in the same room from the arm of a balance graduated to read directly in per cent of moisture carried.

A moisture indicator of this sort is shown in Fig. 1. The average paper may carry on a rainy day as high as 19 per cent of its dry weight of moisture. The instrument is therefore graduated to read from 0 to 20.

Having determined by a series of experiments the variation in strength with moisture content of any particular grade of paper, it is easy to read the indicator and apply the correction.

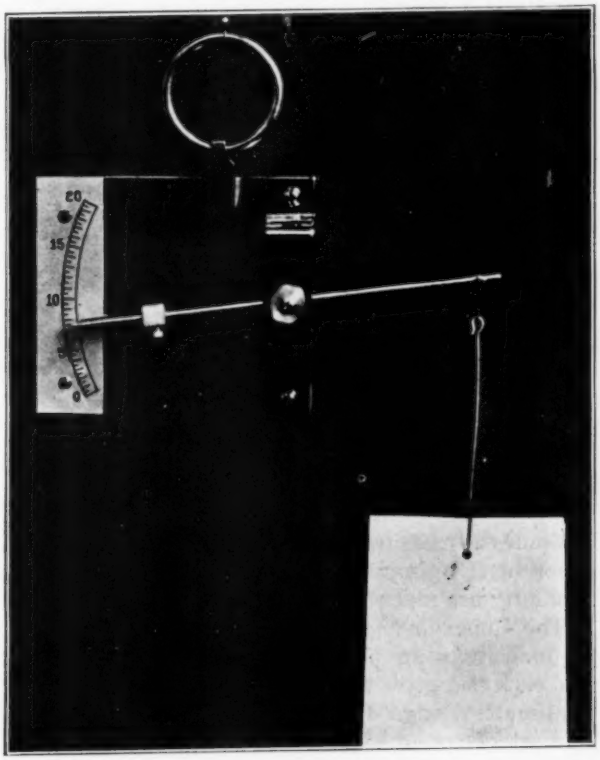

Fig. 1—A Moisture Content Indicator for Paper

Below is a series of determinations made on a good bond and another series on a kraft wrapping paper:

STRENGTH OF BOND PAPER

Moisture Content	Reading of Instrument (eight sheets)									Force in Grams
	1	2	3	4	5	6	7	8	Av.	
0.0	15	15	15	15	15	15	15	15	15	60
0.06	19	19	185	19	19	19.5	19	19	19	76
0.10	22	22	22	22	21	23	22	22	22	88

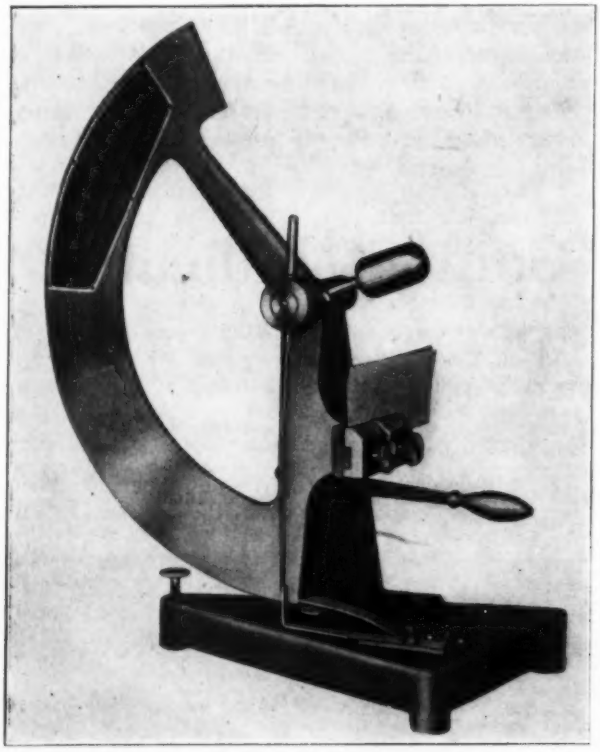

Fig. 2—Elmendorf Tearing Tester with the Specimen in Position to Be Torn

0.13	24	24	23	24	25	24	24	24	24	96
0.16	27	26	26	26	26	26	27	26	26.2	105

STRENGTH OF KRAFT WRAPPING PAPER

Moisture Content	Reading of Instrument (four sheets)							Forse in Grams
	1	2	3	4	5	6	Av.	
0.00	39	35	39	35	38	37	37	300
0.066	51	48	53	51	49	48	50	400
0.09	52	55	50	56	48	52	52	416
0.15	58	56	64	62	65	67	62	500

While the measurements on the bond are, of course, much more uniform, the variation in strength with humidity are much the same for both specimens.

The Elmendorf tester is shown in Figs. 2 and 3. Its indications are perfectly dependable to 1 per cent and each test gives the average strength of a tear 36 centimeters long. It is easy to make four tests on one set of specimens without removing them from the machine, thus giving in less than two minutes a measurement covering a tear 144 centimeters or over four feet long.

The use of the Elmendorf tester in conjunction with the Thwing moisture indicator will mark a distinct advance in the accurate measurement of the strength of paper.

The moisture indicator is, of course, equally useful for use in measurements of bursting strength, tensile strength and basis weight, all of which quantities vary directly with the moisture content.

The Elmendorf Paper Tester shown in figures 2 and 3 has been improved in various details and is now a thoroughly accurate instrument.

The knife for cutting the slit in the sample is attached to the instrument. A simple cutter furnished with the instrument has a gauge set to cut the strips the correct width. They are then clamped in place and the cutter arm depressed, cutting a slit of the proper depth to define the length of the tear.

To make the test the sector is released by depressing the spring stop, which is held down till the sector starts its return swing and then released to damp the swing.

The position of the pointer is read and the clamp loosened so that the sample may be moved to the left about an inch, where it is again clamped and a second reading taken.

For ordinary weights of paper 8 sheets are torn at once and the readings multiplied by 4 to give value in grams. When heavy kraft is tested 4 sheets are used and the reading multiplied by 8.

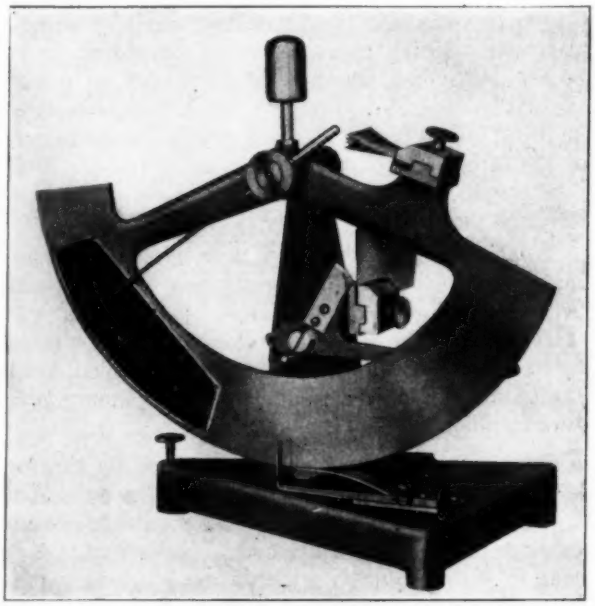

Fig. 3—Elmendorf Tearing Tester Showing the Specimen Torn and the Pointer Indicating the Force

The table above shows the remarkable uniformity of the tests made on the sample of bond paper. No one of these values differs more than one division from the average.

The kraft wrapping paper shows greater variations, as was to be expected.

The instrument may be tested for accuracy at any

time by releasing the sector with no sample in place. If in proper adjustment the pointer will read zero. If not the level may be adjusted slightly and still further adjustment made with the movable pointer stop.

Since the instrument is actuated solely by gravity, it can not get out of calibrations. It has no diaphragms to be replaced and no gauges requiring calibration. All parts are massive, and so ruggedly built that the instrument is well suited for mill use as well as for the laboratory.

Steam Economy in Drying on and Driving of Paper Machines

By R. W. LEEPER

Power Engineer, Management Engineering and Development Company, Dayton, Ohio

Presented by the Heat, Light and Power Committee at the Sixth Annual Meeting of the Technical Association of the Pulp and Paper Industry, on April 13, 1921, at the Waldorf-Astoria Hotel, New York

ONE of the most vital factors in paper mill operation is that of steam supply for drying the products, heating the mill and, in locations where hydroelectric power is not available, driving its machinery, and with steam supply at hand the most economical use of this supply comes immediately under consideration. With the steadily increasing fuel costs of the past few years this question of economy in the use of steam may mean the difference between profit and loss in the manufacture of its product, as with a steam horsepower year running $175 and upwards, the saving of even a few pounds an hour means a material saving per ton of product. In order to secure the most economical operation it is essential that all factors entering into the use of this steam for drying, heating, and power demand, be considered carefully in order to determine in every instance the relative valves of the different methods of utilization.

For the purpose of this article two classes of paper mills have been selected which we shall designate Class A and Class B:

Class A will include those mills using steam power exclusively for drying, heating and power demand, and Class B mills where steam is required only for drying and heating, hydroelectric power being available for the entire power requirements.

This separation is drawn clearly for the purpose of this article. There are a large number of paper mills throughout the States and Canada which will come partly in Class A and partly in Class B. Conditions under the foregoing classifications, exist however, in many mills, and such mills only are considered in this article; but conclusions can be applied to the individual unit where hydroelectric power is available for but a part of its load, the remainder being supplied through steam power, thus combining Class A and Class B in proportion to the quantity of the two power supplies.

In mills under Class A where the entire mechanical load is driven through steam power, power for driving paper machines must be derived from the same source as that for driving the balance of equipment. In mills under Class B, the situation is different, in that with practically continuous drying demand, a steam supply must be at hand, and further this steam supply must preferably be low pressure steam, as the generation of low pressure steam in a boiler plant is not economical. Energy between high pressure steam as delivered from boiler plant and low pressure steam as supplied the dryers is therefore available, and it has been common practice to direct this energy to the driving of the machine itself, the rest of the equipment being driven with hyroelectric power. It can be readily seen, therefore, that in mills under Class B power derived for steam supply is limited to that available from drying demand and also from heating demand, except that this latter demand is exceedingly variable, and as power requirements must be continuous very little value can be placed upon the fluctuating supply to heating equipment. In Class A mills power required for driving paper machines can be derived from the same source as that for the rest of the equipment, steam prime movers being considered mill units, power from which is distributed to all equipment including paper machine. Under Class B the steam prime movers, however, must be considered for operation of the paper machines only.

Class A Mills

For Class A mills there are at least seven arrangements of prime movers that can be considered:

1—The installation of two or more reciprocating engines; one variable speed noncondensing driving variable parts of paper machine, the remainder of reciprocating engine equipment being condensing and either driving equipment other than the paper machines direct, or electrically through a generator and its accompanying motors.

2—The installation of two or more steam turbines; one noncondensing and the remainder condensing, these turbines replacing reciprocating engines under No. 1, utilization of the power therefrom being the same as under arrangement No. 1 electrically.

3—The installation of a noncondensing variable

steam engine, for paper machine drive and one or more condensing turbine generator sets for balance of mill load.

4—The installation of a high and a mixed pressure turbo-generator, the high pressure unit to be noncondensing, all exhaust steam in excess of that required for drying and heating to be delivered to low pressure stages of the mixed pressure unit, machine to be driven electrically.

5—The installation of one or more turbo-generators of the extraction type, extraction steam being supplied paper machines for drying, to heaters or any other locations demanding low pressure steam, the remainder of steam input going to condensers, machine to be driven electrically.

6—The installation of one or more noncondensing reciprocating engines, all exhaust steam over that required for driving and heating to be delivered to low pressure stages of a mixed pressure turbine, the high pressure section acting as a governor to hold a constant output. Machine to be driven direct by noncondensing engine.

7—The installation of a high pressure condensing turbo-generator set, thus furnishing entire power requirements electrically, paper machine driven by variable speed motor supplied from a motor generator set and steam for drying and heating being taken from the live steam supply through a reducing valve before delivery to dryers and heaters.

Class B Mills

For Class B mills where steam supply is required only for drying and heating, there are at least four arrangements that can be considered:

1—Variable speed noncondensing reciprocating engine driving variable shaft, exhaust being supplied for drying and heating with live steam make-up.

2—Constant speed reciprocating engine direct connected to generator for supplying power to variable speed motor driving paper machine.

3—Back pressure steam turbine direct connected to generator, machine being driven as in arrangement No. 2.

4—Motor generator set supplying power to variable speed motor driving paper machine, motor generator set being supplied from hydroelectric sources, drying supply being received from high pressure steam through a reducing valve.

For the purpose of this article a unit producing fifty tons every twenty-four hours has been selected. This unit will require approximately 1,800 hp. of which 250 hp. is required to drive the variable section of the paper machine, leaving 1,550 hp. for the remainder of the mill. An hourly supply of 12,500lb of dry exhaust steam, assumed in this article at 12lb pressure, is required for drying and in addition 2,500lb an hour for five months for heating. Live steam is supplied the prime mover at 150lb pressure at an assumed cost of 75c per 1,000lb. Assuming 300 days operation per year, and reducing these figures to a daily ton basis, there will be required annually for drying and heating an average of 1,950,000lb of steam per daily ton. In the following paragraphs steam consumption and cost figures are given for arrangements outlined above for mills under both Class A and Class B.

A-One

The annual steam consumption of an engine delivering 250 hp. to variable speed shaft will be approximately 1,490,000lb per daily ton to which must be added 585,000lb of high pressure steam for drying make-up and heating requirements. To supply the balance of power load (1,550 hp.) 2,880,000lb of steam per daily ton must be added, making a total live steam consumption of 4,955,000lb per daily ton, equivalent to a cost of $3,720.

If remainder of load is driven electrically in place of directly through reciprocating engine or engines 201,000lb must be added owing to efficiency of generators, making a total consumption under this condition of 5,156,000lb per daily ton, equivalent to a cost of $3,865.

The cost of power installation under No. 1 with all reciprocating engines driving direct is approximately $2,650 per daily ton. With load other than that of paper machine driven electrically, this cost will be increased to $3,230 per daily ton.

A-Two

The steam consumption of a noncondensing turbine generator set delivering 250 hp. to variable speed shaft is approximately 1,800,000lb per daily ton, to which must be added 247,000lb of high pressure steam for drying make-up and heating requirements. To supply the balance of the power load (1,550 hp.) approximately 3,112,000lb of steam per daily ton must be added, making a total live steam consumption of 5,159,000lb per daily ton, equivalent to a cost of $3,870. The cost of power installation is approximately $2,698 per daily ton.

A-Three

The steam consumption of an engine delivering 250 hp. to variable shaft plus the live steam required for make-up is approximately 2,075,000lb per daily ton as in Class A-1. To supply the balance of power load (1,550 hp.) through a condensing turbine generator set approximately 3,112,000lb of steam per daily ton must be added, making a total live steam consumption of 5,187,000lb per daily ton, equivalent to a cost of $3,880.

The cost of power installation including complete electrical drive except variable speed section of machine which is driven direct by noncondensing engine, is approximately $2,442 per daily ton.

A-Four

The steam consumption of two turbines, one high

pressure noncondensing, the other mixed pressure condensing, the entire load being driven electrically, including motor generator set and single motor drive for the variable speed shaft, requires approximately 5,083,000lb of live steam per daily ton, equivalent to a cost of $3,820.

The cost of power installation is approximately $2,742 per daily ton.

In making this calculation two units of equal capacity were selected, the capacity of the two being required to carry the load, however, it was found that these calculations hold true as long as the relative capacities of the two units selected are not too widely variant.

A-Five

The steam consumption of an extraction type turbine generator set of sufficient capacity to drive the entire mill electrically, all steam for heating and drying being extracted therefrom, is approximately 4,710,000lb per daily ton, equivalent to a cost of $3,540.

The cost of power installation, including motor drive for the variable speed shaft is approximately $2,580 per daily ton.

A-Six

The steam consumption of one or two noncondensing engines of sufficient capacity to drive the entire paper machine is approximately 2,188,000lb per daily ton. To the excess exhaust stea mover that required for drying and heating, there must be added approximately 2,720,000lb of live steam for the mixed pressure unit supplying the balance of power (1,400 hp.) making a total live steam consumption of 4,908,000lb per daily ton, equivalent to a cost of $3,680.

The cost of power installation, with the entire plant except the paper machine driven electrically, is approximately $2,564 per daily ton.

A-Seven

The steam consumption of a standard condensing turbine generator set of sufficient capacity to drive the entire mill electrically is approximately 3,670,000lb of steam per daily ton, to which must be added high pressure steam required for drying and heating or approximately 1,872,000lb, making a total steam consumption of 5,572,000lb per daily ton, equivalent to a cost of $4,180.

The cost of power installation, including motor generator set and single motor drive for variable speed section of paper machine, is approximately $2,604 per daily ton.

Herewith are given steam consumption and cost figures for arrangements outlined for Class B mills.

B-One

The steam consumption of an engine delivering 250 hp. to the variable speed shaft, will be approximately 2,075,000lb per daily ton as in A-1, equivalent to a cost of $1,550.

The cost of the power installation including only the engine and accessories therefor is approximately $280 per daily ton.

B-Two

The steam consumption of an engine direct connected to a generator that will deliver through a suitable motor 250 hp. to the variable speed shaft, is approximately 2,112,000lb per daily ton, equivalent to a cost of $1,585.

The cost of power installation is approximately $689 per daily ton.

B-Three

The steam consumption of a noncondensing turbine direct connected to a generator that will supply 250 hp. to the variable speed shaft through a suitable motor, is approximately 2,048,000lb per daily ton, equivalent to a cost of $1,535. The cost of power installation is approximately $526 per daily ton.

B-Four

The live steam consumption for heating and drying, all power being supplied electrically, is 1,872,000lb per daily ton, equivalent to a cost of $1,400, to which must be added the cost of power required for driving the variable speed shaft of paper machine. Assuming a power cost of $27 per hp. year this is approximately $190 per daily ton, making a total cost of $1,590.

The cost of power installation, including motor generator set and single motor drive for variable speed shaft, is approximately $395 per daily ton.

SUMMARY

Plan	Class A Mills	Annual costs per daily ton	
		Steam	Installed
A-1	Engines one non-condensing, the remainer condensing direct drive	$3,720.00	$2,650.00
	Same as foregoing, except load other than paper machine electrically through engine	3,865.00	3,230.00
A-2	Noncondensing turbine, hp. condensing turbo-generator sets	3,870.00	2,698.00
A-3	Engine noncondensing as in No. 1 and a condensing turbine generator set	3,880.00	2,442.00
A-4	Noncondensing turbine, MP turbine generator sets	3,820.00	2,742.00
A-5	Extraction type turbine generator	3,540.00	2,580.00
A-6	Noncondensing engine and MP turbine	3,680.00	2,564.00
A-7	High pressure turbine	4,180.00	2,604.00

SUMMARY

Plan	Class B Mills	Annual costs per daily ton	
B-1	Noncondensing variable speed engine	$1,550.00	$280.00
B-2	Noncondensing constant speed engine	1,585.00	689.00

B-3	Noncondensing turbine generator	1,535.00	526.00
B-4	Motor generator set	1,590.00	395.00

Assuming fixed charges of 15 per cent per year on the investment necessary for each arrangement the following tabulations are a comparison of total costs per daily ton; minimum total charges being fixed at 100 per cent for both A and B mills.

Plans	Annual cost per daily ton			
	Steam	Fixed Charges	Total	Percentages
A-1	$3,720.00	$398.00	$4,118.00	105
	3,865.00	485.00	4,350.00	111
A-2	3,870.00	401.00	4,276.00	109
A-3	3,880.00	366.00	4,246.00	108
A-4	3,820.00	411.00	4,231.00	108
A-5	3,540.00	387.00	3,927.00	100
A-6	3,680.00	385.00	4,065.00	103
A-7	4,180.00	391.00	4,571.00	116
B-1	1,550.00	42.00	1,592.00	100
B-2	1,585.00	103.00	1,688.00	106
B-3	1,535.00	79.00	1,614.00	101
B-4	1,590.00	59.00	1,649.00	104

In arrangements as outlined the efficiency of electrical equipment driving variable speed section of machine has been taken into consideration, also moisture in exhaust or extracted steam. Further, it has been assumed that transmission losses in the driving of equipment other than paper machine, assumed for the unit in question as 1,550 hp., will be the same from driving pulley for a direct mechanical drive (either engine or turbine) as that from the terminals of the generator for this same load furnished electrically through generating equipment driven by this same engine or turbine.

In tabulations under Class A mills it will be noted that the extraction or bleeder type turbine arrangement, A-5, shows the highest efficiency and further this arrangement is especially adapted for installation in Class A mills, in that during each twenty-four hours dryer steam is shut off a paper machine for a certain period either for washing up, during breaks, or other causes, and this period may be of but a few minutes or may extend into many minutes. During such periods there is no drying demand and for a back pressure unit exhaust steam may be bypassed to the air, as for such short periods this prime mover cannot be shut down. The extraction type of turbine is such that only on demand does steam leave the casing other than for power purposes, and therefore during such periods as drying steam is shut off there is no loss, as in the case of the back pressure unit, and while it is impossible to even attempt an approximation of the losses from such a cause in inspection of the roof of a paper mill unit operating with back pressure equipment will convince even a layman that a fair proportion of the company's profit is being dissipated in thin air through the exhaust head. Without doubt should actual losses through a back pressure unit be recorded, and these losses taken as equivalent to a saving for the extraction type, the percentages shown for these two arrangements would be much more in favor of the extraction type of installation.

An installation of a noncondensing engine or turbine, excess exhaust from which is utilized in the low pressure stages of a mixed pressure turbine, functions similarly to an extraction turbine. However, such a combination is more expensive. Unless each unit is of a capacity as demanded by the total load, there are two liabilities present where there is but one with the extraction type; the efficiency is no better and more space is required.

Under Class B mills—arrangement B-1—direct engine drive proves to be the most favorable, being 1 per cent lower in total cost than arrangement B-3. Should licensed engineers be required for reciprocating engines and not for turbines, this 1 per cent difference will be more than offset and arrangement B-3 will be the more favorable.

Modern practice is demanding higher and higher machine speeds, and with these high speeds the sectional drive is fast coming into use. Arrangement B-3 is adapted for such an installation in that turbogenerator set would supply power to sectional motors driving paper machine in place of the single variable speed motor as described under this arrangement. The efficiencies with sectional drive would be slightly lower than those figured for arrangement under B-3, but there is not sufficient difference to warrant a separate calculation.

There are, of course, many other factors entering into selection of such equipment, such as flexibility, ease of arrangement, condition of steam exhausted therefrom, drying and heating demand, initial steam pressures, etc. It is impossible in this article to take into consideration these variable factors and it also may be a question especially in a present unit that a higher steam cost is justified on account of the high initial investment demanded for an installation of more efficient equipment.

For a new mill under either Class A or Class B conclusions reached in this article under present day fuel costs may be taken as a true basis for the selection of steam prime movers. For replacement of equipment in an operating mill under either Class A or Class B, or for new equipment, or replacement equipment, for a mill in an intermediate class, conclusions in the preceding paragraphs may be applied, but the conditions for the mill in question should be investigated carefully, as the many factors present might show an arrangement more profitable to the operator than that decided upon at first sight

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Safety signs and rules are not for ornament but for use. Cleanliness and order and a place for everything are essentials of Safety, says the National Safety Council.

Automatic Coal Weighing Machines and Fuel Conservation

By W. W. CROMLEY

THE fundamental soundness of America is a guarantee for better business in the next few years. During the present period of economic readjustment, business men are putting their power plants in order in confident preparation for the period of better business soon to come.

One hundred million tons of coal per year could be saved by the adoption in the United States of well-known and well-tried methods of fuel conservation, and this saving would be in addition to a similar reduction in the consumption of other fuels. Prevention of waste is merely a matter of the application of well-known engineering principles.

Based upon only 100,000,000 tons, the money saving would be $600,000,000 per year, or enough to pay nearly one-half the interest on our national war debt.

The transportation of coal would be relieved to an extent equivalent to a million and a half 50-ton carloads per year, or 50 per cent more than the coal-carrying capacity of the Pennsylvania Railroad lines east of Pittsburgh. The significance of this will be realized when it is stated that the chief difficulty in securing coal today is due to lack of transportation facilities.

The services of 90,000 miners would be conserved so that the same force would be able to handle the natural increase in mining production. The additional labor connected with the loading, transportation, and unloading and firing of a million and a half less cars of coal per year would also be eliminated. The railroad equipment and train crews relieved from coal haulage would be of great service in the handling of other additional freight. The saving of coal in the United States would equal England's deficiency of 90,000,000 tons annually in her program of coal exportation. Such conservation would reduce the cost of manufactured goods. Practically nothing is manufactured without coal, so that every thing in the cost of living would be affected by this program. Fuel conservation would add materially to the life of our coal deposits and the supply of other fuels. Coal cannot be produced and there is no way of replacing the coal taken from our mines. Therefore it is incumbent upon us to use economically our diminishing supply of fuels. A common-sense engineering program of fuel conservation would save over $5.00 per capita for every man, woman, and child in the United States annually. Engineers under a suitable program of fuel conservation would find the opportunity to apply their highest abilities for the development of their country and themselves.

Fuel is the greatest industrial problem of the age. Coal is the life blood of industry, and anything that improves the condition of the blood of industry will eventually receive the endorsement of both the manufacturers and the general public.

Adoption of Labor-Saving Appliances

Industrial advancement is always marked by improvements in industrial processes; labor-saving appliances are adopted, modern machines take the place of equipment of obsolete design, and refinements of operation are established to secure the maximum effectiveness from the apparatus in service.

Lowering operating costs is the impelling motive for improving industrial conditions. Every plant owner is interested in the safety, comfort and general welfare of his employes and is willing to spend money for this purpose but each expenditure should be an investment which will directly or indirectly pay for itself. Better working conditions, smokeless operation, improved appearance are incidental results (welcome ones, of course) which may contribute indirectly to the commercial value of the investment, but one of the most important results of improper labor conditions is frequently unrecognized. The introduction of modern labor-saving devices, such as individual boiler scales, mechanical stokers, coal and ash handling equipment, steam flow meters, etc., has attracted to the boiler room a higher type of labor, men of greater skill and intelligence, who possibly did not possess the strength and endurance necessary in the plant where the scoop shovel and wheel-barrow were the only appliances provided for the fireman's use.

These incidental results may influence the decision, but the real determining factor will always be the "dollars and cents" value of the contemplated improvement—"Will it pay?"

Every economy must be practiced by the successful competitor. Plants should be overhauled and improvements made to secure the greatest efficiency in production. The greatest improvement that can be made in many plants is putting fuel consumption upon an economical basis. Many who are responsible for the equipment and management of power plants are unfortunate in not having at hand information that will enable them to do this. The absolute knowledge of certain facts is essential if they are to apply scientific methods to their fuel problems, or to realize and appreciate the waste that may be involved in their present method.

The Result of Continuous Care

"One hundred ninety-one firms reported a total of 24,736 employees engaged in the manufacture of coal-tar products, 2,605, or 10.5 percent. were chemists or engineers. This is probably a larger proportion of technically trained men than will be found in any other important manufacturing industry in the U. S."—*United States Tariff Commission Report.*

The reason for this preponderance of technicians is that each step in the intricate synthesis from the lump of coal to the brilliant dyestuffs must be under the constant observation of chemical engineers.

Coal-tar dyestuffs are the final effect of months of tedious laboratory research coupled with more months of semi-commercial experimenting and the last stage of actual plant production. Each step has its ever-watchful chemist, for the greater the care the better the dyestuff.

Du Pont Dyestuffs are what they are, because some 4000 earnest workers labor for their excellence, and of this number 470 are chemists or technically trained men.

E. I. du Pont de Nemours & Co., Inc.
Dyestuffs Sales Department
WILMINGTON, DEL.

Branch Offices
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Philadelphia Chicago
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The Use of Automatic Scales

There is no information of more importance than that given where automatic scales are used which show a record of the amount of coal fed into each individual boiler and the amount consumed by all the boilers which checks the amount purchased and paid for over a given period of time. No record can be made more telling in its effects upon boiler room efficiency.

For instance, it indicates almost instantly any defect developed in the fire bed under a given boiler, by showing the increased amount of coal consumed in that particular boiler.

It enables a comparison between coal used and the output in power over any given period; thus enabling the running of a boiler at such capacity as will give the highest fuel economy.

By indicating the output of the individual boilers, it singles out those boilers that are running at lower capacities and prevents the overheating and burning out of the arches in the other boilers. It stimulates the interest of the fireman by showing the immediate results obtained from better firing. This eliminates the drudgery in the boiler room by placing the work on a basis of rivalry and sport, each fireman trying to make his "clock" show better than his neighbors.

The value of specifically designed automatic scales to meet exact requirements is being recognized more and more each day. Never before has there been such urgent need for scale equipment that will save time and increase production.

Until a few years ago automatic scales were looked upon with distrust and probably with good reason, since actual trial in the field has been needed to demonstrate their proper use. It has been shown to the satisfaction of the most critical engineers that coal cannot be weighed efficiently without the use of automatic scales. The fact that power plants should be equipped with some device for the weighing of coal cannot be disputed. However, some plants are still operating without any check whatsoever of their coal. By the lack of weighing machines you may lose in one year, many hundreds of dollars more than enough to equip your plant with a complete line of the most modern machinery.

The day of the automatic scale is here, whether it is used in connection with a traveling weigh larry or as an individual boiler scale, but with the high prices of fuel an absolute check can be gotten in no other way. There are many unquestionable advantages that individual boiler scales have over the system where a traveling weigh larry is used. The operation of the larry requires the constant attention of one man, consequently, his services can be eliminated which would alone effect a saving of approximately two thousand dollars in a single year. The initial cost to install the larry, track, one scale and the necessary supports would practically be the same as six individual boiler scales would be, and then you have no positive check on the different boilers. You do not know which boiler is "hogging" the coal, unless a written record is taken as the larry is moved to show the amount deposited in each stoker hopper and this will vary to a great extent. The only accurate record a weigh larry can give is the total amount of coal consumed. Individual boiler scales give you this amount as well as a positive and accurate check on the amount of coal each boiler consumes, and it is recognized that this is a most important item to consider.

A Big Saving

In a recent test made in one of the largest power plants in this country, it was found that the variation in the amount of coal consumed by 26 boilers amounted to an average difference of 3 tons in every 24 hours. Three of these boilers were burning 8 tons more and 2 boilers 10 tons more than the others which were of the same size. Not until individual boiler scales were installed could they get the positive check on the efficiency of each unit and by having this check, conditions were brought about to correct the trouble, but without scales serving each boiler, the condition would apparently have gone on indefinitely without notice.

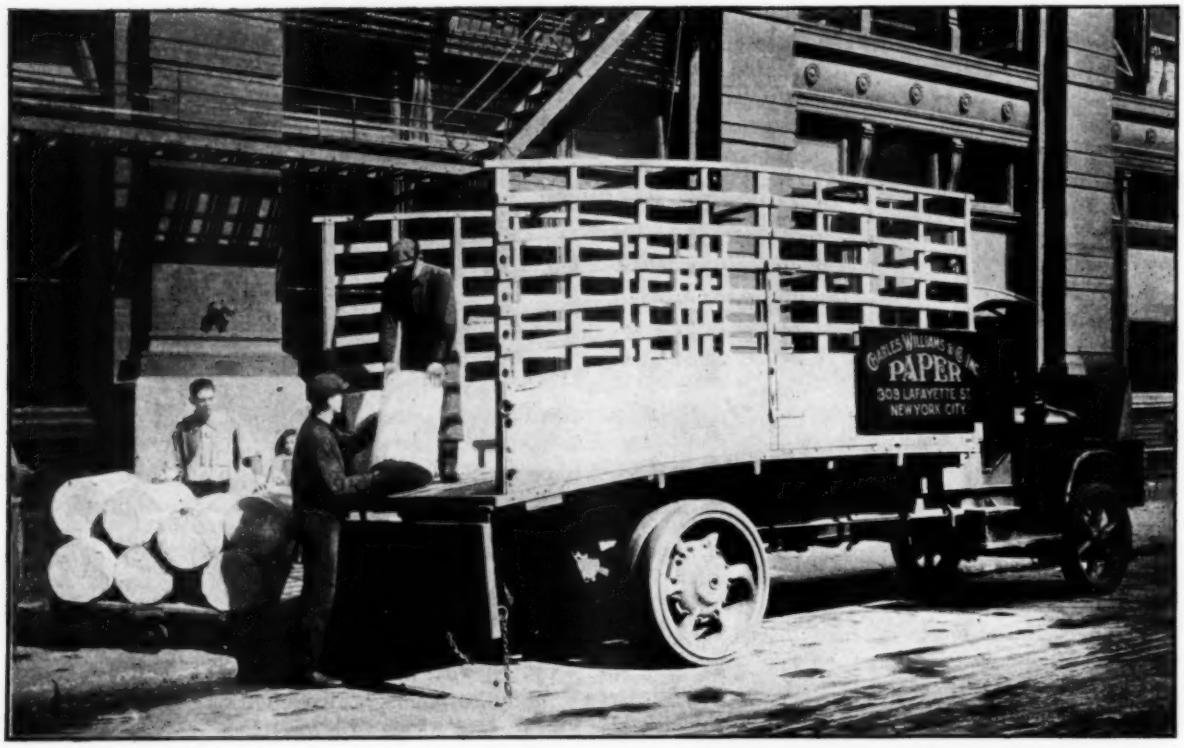
Many automatic coal weighing machines of varying degrees of success have been built. Some were too complicated and continually gave trouble, dust filling up the joints and preventing the machine from operating. Some would refuse to weigh wet coal; others have been huge and clumsy, but there are machines which fulfill the most exact requirements. They withstand the most severe tests and have been found to be accurate, dependable and positive in operation which is the one point we have all been waiting for in automatic scales for years. With the coming changes in industrial advancement, it is time the smaller power plants are improving their equipment and placing their plants on a basis of high efficiency the same as large central stations have done where automatic scales are installed.

Size of Coal

The size of coal has a considerable bearing on the relative capacities and efficiencies obtainable from a boiler. The air pressure penetrates the fuel bed formed by the coarse coal easier than the fuel bed formed by the finer coal, resulting in disturbance of the best furnace conditions.

Worry and Trouble and Care on day
Started for town on the early car,
But Laughter was there with her sunny ray,
And none of the travelers got so far.
She smiled at one end and then at the other,
And first thing out they went
And the town was better that day, my brother,
And sweeter, and more content.

—Folger McKinney.



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DOING the most work for the least money is an achievement of White Trucks which never could have been attained by any mere theory of construction. It is the result of experience — years of studying transportation needs and building the truck that will meet them.

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White Trucks

Some Practical Aspects of Installing Cost Systems

By C. OLIVER WELLINGTON

Member of the Firm, Scovell, Wellington & Co.

Address Before the Cost Association of the Paper Industry, on April 13, 1921, at the Waldorf-Astoria Hotel, New York

IMMEDIATE results in lower costs are what executives want and need today. Up to recent times most executives would attempt to secure such results with a "slashing" policy, cutting expenses right and left, cutting wages, cutting salaries, discharging so-called non-productive workers and generally breaking down the organization.

Do such methods really bring results? Most certainly not if we are to look beyond the immediate future, and it is doubtful if the immediate results are as satisfactory as they appear.

It is in times like these that a good practical cost system is of the greatest value. By this I mean a cost system not designed purely from an accounting standpoint, but one that squares with the practical conditions in the mill and states results so the mill men can understand them. I mean a system designed to give the executives information and not merely to make the debits and credits balance; one built up from the engineering viewpoint rather than from the office viewpoint.

Normal Costs

Actual costs of goods produced were probably never so useless as at the present time. The old fashioned way of dividing the total actual expense for a month or period by the production measured in pounds or hours, or some other basis, gives costs under present conditions of slack operation so high that they are worse than useless to the executives. If they are to properly determine their manufacturing and selling policies, they must entirely disregard such costs. Present conditions therefore emphasize the importance of figuring costs on the basis of normals or standards for production and operating expenses. The setting of normals or standards emphasizes again the importance of the engineering or mill viewpoint towards the subject of costs, as these normals or standards must be set from such a viewpoint if they are to be really valuable as a measure of the actual conditions in the mill.

If the careful engineering studies have been made that should have been made before the standards were set, the executives now have at their command not only what costs actually are, but **what they should be.** The labor records, the material records, and the production records for each tour, for each day, and for each week are reported to them showing where, and to what extent, the various departments in the mill are falling below the standards. For example, how many men or machines were idle and for how long, due to causes such as waiting for work, breakdowns on machines, lack of power, etc. With proper records and standards, if the working force must be reduced, a fair ratio can be kept between the workers left on the job and the actual production.

Records Alone Will Not Reduce Costs

The executives may have the most valuable data showing what should be done to reduce costs, and they may formulate sound policies on the basis of such data, but they must depend upon the organization to get the desired results. The analytical data obtainable from a practical cost system will do two things: (1) Help the organization to control the business and reduce costs, and (2) indicate where the organization itself has been weak. In most mills the largest savings can be made through improving the effectiveness of the organization.

What can an organization do to cut costs? It can improve processes and operations, avoid preventable waste, and make labor more efficient. A prosperous mill and an unprofitable one may have the same machinery, and buy the same materials. The difference is in the two organizations. It is therefore easy to see how shortsighted will be a slashing policy at the present time which disrupts the organization, as the immediate savings in salaries and wages will be more than offset by the loss of control and the increase in the direct costs of material and labor.

Importance of Planning and Production Control

One important function of a proper organization is to effectively plan the work to be done, and control it through the various operations, thus eliminating insofar as possible the starting and stopping of numerous small orders and obtaining for the orders as a whole the maximum production with the least direct cost. In considering a cost system I cannot emphasize too strongly its dependence upon a properly designed and operated system of planning and production control. While, under present circumstances, this may not seem as important as formerly, if properly handled it should now be an effective means of keeping costs as low as possible.

Necessity for Definite Written Instructions

One of the most important differences between success and failure in installing cost systems is the use or lack of definite written instructions.

Have You Heard

of the

New Safety Device

for your

Paper Machine Reels?

The Object Is——

To Avoid Dragging Men In Between Reels

A space of 8 inches is always maintained between the reels. Upper reel may become full but can only come within 8 inches of lower reel and vice versa. Again, with the same amount of paper on both reels, the 8 inches is still maintained and never becomes closer. This space between reels eliminates the catching of clothing, arms, etc.

Nekoosa Motor & Machine Company

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Not long ago we were called in by the president of a large paper mill to install a cost system and found that several years previously the same company had employed a cost accountant (an individual—not a firm). At about the same time they assigned to one of their men the duties of operating the system. These two men worked together, the cost accountant designing forms, setting up ledger accounts, and developing the procedure for handling the work. After several months the cost accountant finished his work and left, and the man employed by the company to operate the system continued the plans. Not many months later he left the employ of the company, and when he walked out the door the entire cost system went out with him.

The system may have been very good or very bad, but no one beside these two knew of what it consisted or how it was to be operated. There were no written instructions of any kind as to the handling of forms, or ledger accounts, or the connection of one with another, and as a result the company had absolutely nothing except a few detached forms, the use of which was not clearly understood, to show for all they had spent on the cost system.

In the practice of our firm in installing systems definite written instructions are prepared covering the use and handling of every form, every account, and every procedure. These are discussed with all those in the organization affected by them, an agreement is reached as to the best method under all the circumstances and copy of the instructions is given to each man affected. With these definite written instructions the handling of the system does not depend on any one man's memory, and no one can dodge responsibility really his by claiming that he did not understand.

Such methods not only protect the investment of the company in the system, but eliminate from the operation of the new plan the doubts and uncertainties which in many cases have led to the downfall of systems, or to their operation way below a reasonable maximum of efficiency in getting results for the executives.

Unearned Burden

At the present time most mills are down several days a month, or at least several machines are down a considerable proportion of the time, so that a cost system based on the theory of what we call "unearned burden" is of particular practical value to the executives. Under this plan the normal production, usually in hours is applied to the normal or standard for operating expenses, giving a normal cost which is applied to the work actually done. The difference between this normal and the total actual cost represents the loss from manufacturing capacity which could have been utilized but has not been, due in most cases to lack of orders. By eliminating this element from current costs the executives can still compare the efficiency of the mill when it is operating with similar work done under more normal conditions and can hold the superintendent and foreman to reasonable standards of efficiency.

Material Price Fluctuations

Another important factor in costs under present conditions is the price at which you should figure the principal raw materials entering into your products. In almost every case, since the summer of 1920, there has been a substantial reduction in price. Many mills are still carrying materials contracted for at higher prices, and the question arises whether these materials should be figured into current production at what they actually cost, or whether you should recognize that the loss has already been suffered through the drop in market prices.

It is obvious that you cannot expect your customers to pay in the selling price for more than the current market price of your raw materials plus a fair cost for conversion and a fair profit. If there has been a loss on your raw materials you must stand that loss. When I addressed the Connecticut Valley local branch of your association in Holyoke on February 9, 1920, on "How to Determine the Proper Selling Price" I emphasized the importance of using market prices for estimating rather than what your raw materials happened to cost. This address, by the way, has been reprinted in booklet form and copies are available if you care to ask for them. I hope that all of you followed the market price method during the period of rising prices of materials and built up a reserve to offset the corresponding loss which all mills are now suffering through the drop in prices.

There are two ways of handling the loss from reduction of material prices. One is to figure the raw materials at cost, taking the loss as shown when the goods are sold, or perhaps when they are put into finished stock inventory at a net market price below cost. The other is to charge materials into production at current market prices, carrying the difference immediately to a profit and loss account which might be entitled "Material Price Fluctuations." This second plan has several advantages. It keeps the current cost on more nearly an actual current basis, in agreement with current conditions. It throws the loss into the period when the loss actually occurred through the drop in prices, rather than into a later period when the raw materials are used. It enables the operating men to show a profit if one can be earned using current raw material and selling prices and current conversion costs.

In using this plan a definite price for the principal raw materials will be set for each period. Minor fluctuations in purchase prices can therefore be disregarded in the current calculations and picked up in total at the end of the period and carried to the account "Material Price Fluctuations" already mentioned.

The mills that have been operating their costs

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on this basis during the past five years know how much of their profits have been due to a rising market and how much from the regular conversion of raw materials into paper. With a falling market they can still keep these two factors separate.

Importance of a Budget

The suggestion just made for controlling material price fluctuations, as well as the earlier suggestions regarding the figuring of costs on a normal basis and the principle of unearned burden, are all fundamentally the same as the idea of a budget. While you may think of the term budget as applying principally to governmental bodies and institutions, a budget can be applied with equal if not greater success to most manufacturing businesses. Just consider how much more safely and securely a business can be operated if plans for it have been carefully considered and laid for a year in advance, as to expected **sales, expected purchases,** expected payrolls, expenses, etc.

There is a very great psychological advantage in having the heads of the various departments sit down and figure a budget, each man for his own department and in relation to the business as a whole. The sense of mutual relationship and organization grows by jointly discussing the figures, developing the necessary connection of one department with another, and finally agreeing upon a workable plan. Every man will be more careful and thoughtful as to the operations in his department if he is on record with an estimate as to what he can do and expects to do, which estimate he knows will be measured with what he actually does accomplish.

If the general accounting as well as the cost accounting of each mill is developed along the budget plan, the accountants and cost men can help the executives control the business by not only showing what results have been secured, but by seeing that the results which should be secured are secured.

Such service will require study and vision, but it will surely bring its reward to the company and the individual.

The Effect of Variables on Bleaching Efficiency

By GEORGE K. SPENCE

Report of the Soda Pulp Committee before the Sixth Annual Meeting of the Technical Association of the Pulp and Paper Industry, on April 13, 1921, at the Waldorf-Astoria Hotel, New York

WHILE from practical experience in bleaching soda pulp, I have always found that best results have been obtained when the temperature was about 120° Fahr. many authorities insist that the bleaching temperature should not be permitted to go above 100° Fahr.

These same men when actually cornered on the question will admit that they are using a higher temperature on their stock, but will offer the excuse that they are cramped for space and must raise the temperature in order to get out the required amount of stock daily.

The experiments outlined in this paper were conducted in order to determine the effect produced by varying the temperature and consistency of the stock in the bleaching operation.

A sample of Northern poplar stock well cooked by the soda process was procured, some of the water removed, the stock well mixed and preserved in air-tight containers, after first having determined the moisture content. Some of the same stock was used for all bleaching experiments.

The different consistencies were obtained by diluting samples of this prepared stock with distilled water. If mill water containing any appreciable amount of organic coloring matter had been used in this dilution, the varied consistencies would have had a more marked effect on the bleaching results.

Electrolytic bleach solution was used, after having been filtered before being tested in order to eliminate any chance of the comparative results being affected by the presence of grout.

At the completion of the bleaching operation each sample was divided and one half treated with acid, after which each part was washed separately and made into sheets for comparison.

The standard sheets were made by taking some of the same stock used in the experiments, diluting to a 6% consistence, bleaching at 118° Fahr. to 120° Fahr. and treating the bleached stock with acid.

The different standards were made by using respectively 10-lb, 9½lb, 9-lb, 8½lb, etc., down to 6-lb or 35 per cent bleach per 100-lb of air-dry fiber, or in other words, from 60 per cent to 100 per cent of a 10-lb bleach figure.

These standard sheets were used in matching all sheets made during the experimental runs.

The following tabulation will show the effect of varying the consistence of the stock from 3 per cent to 7½ per cent and the bleaching temperature from 95° Fahr. to 145° Fahr.

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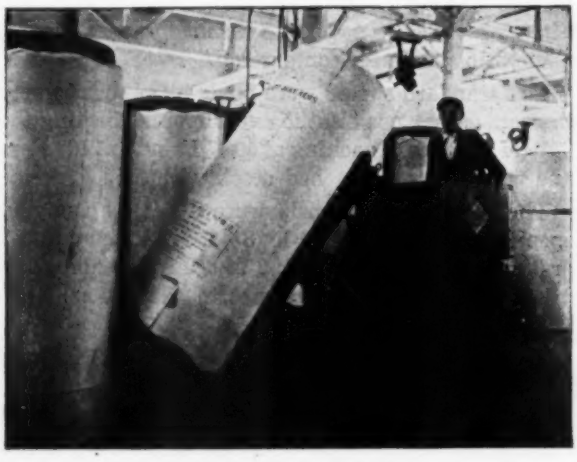

Roll Being Placed on End Disc

Removing Roll from Car

It will be noted that the acid-treated samples of 7½ per cent stock bleached at 108° Fahr. to 110° Fahr. and also that bleached at 118° Fahr. to 120° Fahr. are marked 100 per cent plus. This was because these two samples were a little brighter than the standard made by bleaching a 6 per cent consistence stock at 118° Fahr. to 120° Fahr. with 10-lb of bleach per 100-lb of air-dry fiber.

This tabulation is self-explanatory and shows that increasing the consistence improves the color and shortens the bleaching time. It also shows that increasing the bleaching temperature up to 120° Fahr. improves the color and shortens the bleaching time, while an increase of temperature much beyond this point will shorten the bleaching time, but lower the color.

Cooked by the Soda Process—Northern Poplar Stock

Consistence of stock when bleached	35% bleach used per 100 lb. air dry fiber	Bleaching temperature	Time required to spend bleach	Shrinkage or fiber loss in bleaching	Bleached Color Without acid	Bleached Color With acid	Remarks
4%	10 Lbs.	95° F. - 98° F.	7½ Hours	2.1%	60%	80%	At the end of 7½ hours all samples in this set contained unspent bleach. The samples were divided, one-half treated with acid and the other half allowed to stand at ordinary room temperature until morning. They were then washed and made into sheets for comparison.
3%	10 Lbs.	95° F. - 98° F.	7½ Hours	2.1%	60%	80%	
5%	10 Lbs.	95° F. - 98° F.	7½ Hours	2.1%	62%	85%	
6%	10 Lbs.	95° F. - 98° F.	7½ Hours	2.1%	63%	85%	
7%	10 Lbs.	95° F. - 98° F.	7½ Hours	2.1%	65%	87%	
7½%	10 Lbs.	95° F. - 98° F.	7½ Hours	2.1%	65%	89%	
3%	10 Lbs.	108° F.-110° F.	7 Hours	2.33%	74%	90%	The bleach was completely spent on the 5% consistence stock in 7 hours, but the 3% and 4% consistence stock showed the presence of unspent bleach. The samples were divided, half being treated with acid, and both washed and made into sheets for comparison.
4%	10 Lbs.	108° F.-110° F.	7 Hours	2.33%	76%	93%	
5%	10 Lbs.	108° F.-110° F.	7 Hours	2.33%	79%	95%	
6%	10 Lbs.	108° F.-110° F.	6¼ Hours	2.33%	83%	98%	
7%	10 Lbs.	108° F.-110° F.	5½ Hours	2.33%	85%	100%	
7½%	10 Lbs.	108° F.-110° F.	5 Hours	2.33%	88%	+100%	
3%	10 Lbs.	118° F.-120° F.	8¼ Hours	2.5%	92%	94%	When making this set of tests time was allowed for the bleach to spend completely in each case before treating with acid and preparing sheets as above.
4%	10 Lbs.	118° F.-120° F.	7 Hours	2.5%	93%	96%	
5%	10 Lbs.	118° F.-120° F.	5¾ Hours	2.5%	95%	98%	
6%	10 Lbs.	118° F.-120° F.	4¾ Hours	2.5%	95%	100%	
7%	10 Lbs.	118° F.-120° F.	4 Hours	2.5%	96%	100%	
7½%	10 Lbs.	118° F.-120° F.	3½ Hours	2.5%	96%	+100%	
3%	10 Lbs.	128° F.-130° F.	6 Hours	2.58%	92%	93%	The shrinkage, or fiber loss, was determined in each case by combining the six samples in the set.
4%	10 Lbs.	128° F.-130° F.	4¾ Hours	2.58%	92%	94%	
5%	10 Lbs.	128° F.-130° F.	3¾ Hours	2.58%	92%	94%	
6%	10 Lbs.	128° F.-130° F.	3 Hours	2.58%	94%	96%	
7%	10 Lbs.	128° F.-130° F.	2½ Hours	2.58%	94%	96%	
7½%	10 Lbs.	128° F.-130° F.	2¼ Hours	2.58%	95%	97%	
3%	10 Lbs.	143° F.-145° F.	3½ Hours	2.78%	87%	89%	
4%	10 Lbs.	143° F.-145° F.	2¾ Hours	2.78%	87%	90%	
5%	10 Lbs.	143° F.-145° F.	2¼ Hours	2.78%	88%	90%	
6%	10 Lbs.	143° F.-145° F.	1 hr. 55 min.	2.78%	88%	90%	
7%	10 Lbs.	143° F.-145° F.	1 hr. 40 min.	2.78%	88%	91%	
7½%	10 Lbs.	143° F.-145° F.	1 hr. 30 min.	2.78%	88%	91%	

A New Weightometer for Soft Stock, Chips and Acid

By E. J. TRIMBEY

Presented at the Sixth Annual Meeting of the Technical Association of the Pulp and Paper Industry, on April 13, 1921, at the Waldorf-Astoria Hotel, New York

THE pulp and paper industry is one which from the nature of the raw materials used does not lend itself to accurate accounting methods. The foundryman can weigh his raw materials and know exactly how much comes into the plant; but in the pulp and paper industry aside from the filler, sulphur, lime and other minor ingredients, no exact measurements or records can be kept.

To be sure wood is bought by the cord, but what is a "cord"? The answer seems easy enough—it is a pile four feet high, four feet wide and eight feet long, or 128 cubic feet; but in practice two cords seldom contain the same cubical contents of solid wood, this being dependent among other things on the average diameter and length of the sticks and the manner of piling. Varying as it does with the kind of wood, the

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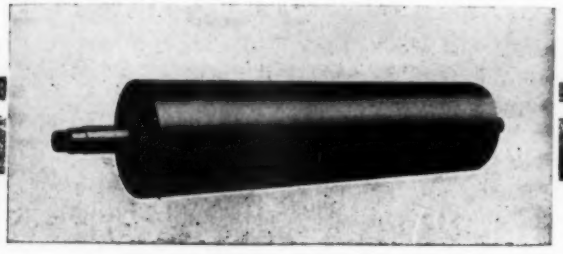

length of time stored, and the conditions under which stored, the same cubical content of solid wood does not represent the same yield or content of usable pulp.

After the pulp has been made and passed on to the paper mill man he has no means of knowing just how much he is getting. The cost of lapping and handling pulp is so great that, where it is to be used at once, most mills resort to the use of thickeners and pump it in the form of "soft stock." With pulp pumped to the beaters or mixing machines as "soft stock," an intelligent guess was the best that could be hoped for as regards the relative proportions and the quantities used. The development of a practical and reliable consistency regulator did much to eliminate this uncertainty, and a consistency regulator which controls the stock as it is being pumped from the pulp storage tanks to the beaters or mixing machines is now standard equipment in all up-to-date mills.

For some time past the News Print Service Bureau has been endeavoring to bring about the adoption of a uniform cost accounting system in all mills; if such a system were to be adopted two things would need to be known: namely, how much actual pulp producing wood came into the mill, and how much of each kind of pulp was used. For this purpose the "cord," varying as it does, is not sufficiently accurate as a measure of the wood used, and the "good judgment" of the beater man is surely not accurate enough as a measure of the proportional parts of pulp used, though up to the present time they have been, apparently, the best to be had.

In the case of the sulphite mill especially, it is difficult to determine accurately the wood used. Samples of the chips can be taken for moisture tests, but the automatic methods of weighing, which are fairly satisfactory for coal, ore and other heavy substances, do not seem to be practical for weighing chips. When

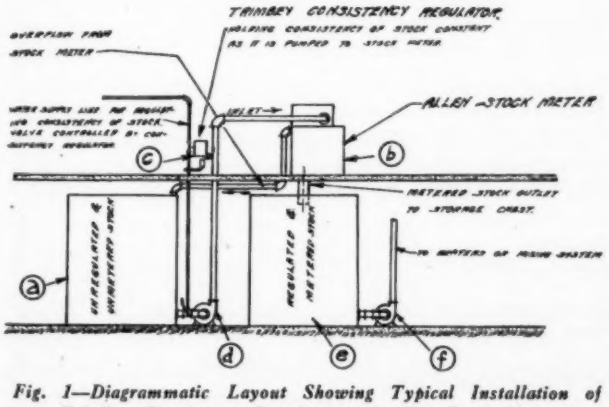

Fig. 1—Diagrammatic Layout Showing Typical Installation of Trimbey Consistency Regulator and Allen Stock Meter

the pulp is used as "soft stock," even though the consistency regulator can be depended upon to maintain a uniform consistency, none of the metering methods or devices which are applicable to water or ordinary liquids are suitable at the ordinary consistencies at which the stock is pumped and used.

It was the need of an accurate and practical method of weighing chips, "soft stock," etc., which led to the development of the Allen Weightometer.

The application of the Allen weightometer as designed for "soft stock" is shown in Fig. 1. Stock from the storage tank a is pumped to the weightometer b,

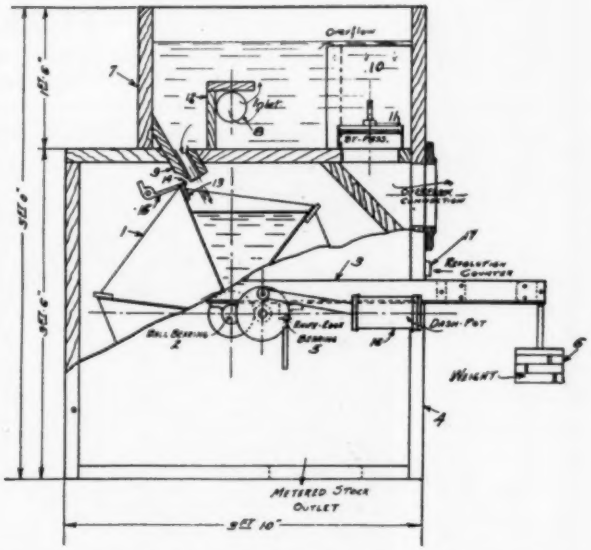

Fig. 2—Details of Allen Weightometer. For a 25-ton capacity a day, vat dimensions are 3 ft. 10 in. by 3 ft. 10 in. by 5 ft. high

a portion going to the consistency regulator c, which controls the addition of the necessary amount of water to the suction of the pump d, so that the stock going to the weightometer is always at the exact consistence desired; the stock which goes to the consistency regulator returns to the chest a, while the stock passing through the weightometer goes to the chest e, from which it is pumped by the pump f to the beaters or mixing machines. In chest e is a float operating a by-pass valve in b so that when the level in e reaches a certain point the weightometer becomes inoperative and the stock returns to a until such time as the level in e falls, when the weightometer automatically begins to operate.

Fig. 2 shows the arrangement of parts of the weightometer itself. It consists of a hexagonal rotor 1 with shaft carried on ball bearings 2, which are attached to the scale beams 3, one on either side of the vat 4; these scale beams are supported on knife-edge bearings 5, and the weight of the rotor and the stock it contains is counterbalanced by the weight 6. At the top of the vat 4, is an inlet compartment 7, supplied through the pipe 8, and with a spout 9, for directing stock into the rotor 1. At 10, is an overflow for returning the excess to the supply tank, and at 11, is the by-pass valve for returning all the supply to the supply tank when the receiving tank for metered

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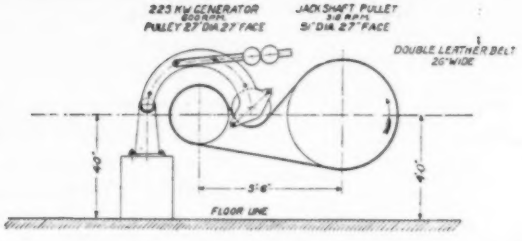

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There are many installations of LENIX drives in paper mills and it has been found the ideal drive for beaters and other machines in the Paper Industry particularly where compact and resilient drives are required.

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stock reaches a predetermined level; this by-pass valve is operated by a float. The baffle 12, is installed to divert all the stock through the by-pass valve when it is open. Attached to the side of the vat 4, is a revolution counter which records the number of times the scale beams 3 are raised and lowered.

Attached to each compartment of the rotor is a projecting arm 13, which engages with a stop 14, connected to the end of the vat; this prevents further rotation while a trigger 15 falls into place behind arm 13 and prevents any backward movement. Stop 14 is so located that when arm 13 is between it and trigger 15 the upper compartment of the rotor will be in such a position that its center of gravity will be some little distance ahead of the vertical plane passing through the center of the rotor.

Operation

The operation of the weightometer may be described as follows:

Stock enters 7 through pipe 8, passes over baffle 12 and through spout 9 into the top compartment of the rotor. As the stock continues to flow the weight increases until the combined weight of rotor and stock just balances the counterweight 6. When this point is reached that end of the scale beams 3 mounted on the knife-edge bearings 5 is depressed and arm 13 slips below stop 14; at this instant, since the compartment was in such a position that its center of gravity was off center as regards the main shaft, rotation begins. When a movement of about two inches has taken place the incoming stock is diverted into the next compartment as it comes into place, and the filled compartment begins to empty. The weight of the counter weight is such that the scale beams tip before the compartment is full and in this way no stock leaves the first compartment until the rotor has moved a sufficient distance to divert the incoming stock into the next compartment. In this way it is impossible for stock to be flowing both into and out of a compartment at the same time and so affect the accuracy of the meter. As soon as some of its load has escaped, the counterweight again elevates the scale beams carrying the rotor and when the next arm 13 comes around it lifts the trigger 15, which immediately drops into place behind it, and the rotor comes to rest with arm 13 between 15 and the stop 14. The dash-pots 16, are installed one on either side of the vat to absorb the momentum and cause the rotor to come to rest without too much shock. A recording counter 17 gives a record of the number of charges dumped, and as each charge consists of the same weight of wet stock and the consistency regulator will maintain the average consistency within two or three hundredths of one per cent consistency, the total dry weight for the period is readily obtained.

The weightometer may be used for determining the amount of stock furnished from one department to another, or to determine the entire output of the pulp mill so as to have a daily check on the yield per cord, or per hundred-weight of wood used. Where baled papers are purchased and after washing and deinking are used as a part of the furnish, this gives a ready means of determining the yield of usable pulp obtained, and the proportion of shrinkage in shipments from different firms.

With appropriate changes in design this weightometer can be used for weighing chips in a sulphite or soda mill. With moisture determinations at regular intervals, and the accurate weight of the chips, the amount of available pulpmaking material going to the digestors is known, as recent tests have shown that the available yield of pulp varies directly with the air-dry weight of the wood regardless of kind or quality.

Another point in the mill where this weightometer can be used to good advantage in the interest of more accurate accounting is to determine the amount of raw acid made. With the rotor made of the proper acid-resisting materials, the acid coming from the Jenssen towers or the milk of lime system can be weighed before being pumped to the raw acid storage tanks.

The Allen weightometer is not limited to paper mill use alone, but can be used for weighing grain, coal and many other materials.

Fire Extinguisher for Cold Climes

THE problem of producing a fire extinguisher that will not freeze in the winter season is one that has engaged the best minds in fire protection circles for many years.

This difficulty is stated by a well known manufacturer to have been overcome and that they have finally produced a 2½ gallon extinguisher that will work in a temperature of 40 degrees below zero. This new extinguisher is called the "Allweather" and has been tested in every conceivable manner, even to the extent of packing it in carbon dioxide snow with a temperature of 40 degrees below zero, as well as freezing it into a cake of ice, in which it was operated, and discharged a perfect stream of fire extinguishing liquid a distance of from 30 to 40 feet. This type of extinguisher will meet the urgent need of those with the responsibility of fire protection in all sections of the United States and Canada, where the thermometer goes below the freezing point in the winter time.

This extinguisher resembles all the ordinary 2½ gallon extinguishers and is constructed in strict accordance with the best approved practice. It is an ideal device to have around certain sections of paper mills, pulp mills, wood yards, etc., where ordinary extinguishers and other apparatus to fight fires are frozen up in the winter time.

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Knox Woolen Company

Camden, Maine

Briner Economizer Using Only Waste Heat for Ventilation of Machine Room

By W. H. HOWELL, Jr.

Presented at the Sixth Annual Meeting of the Technical Association of the Pulp and Paper Industry, on April 13, 1921, at the Waldorf-Astoria Hotel, New York

WE ARE indebted to E. A. Briner, ventilation engineer, for the data and figures submitted in this paper. These results he obtained in the machine room of the Champlain Mills of the New York & Pennsylvania Company, the writer not having the time and the facilities to make these tests personally. The results obtained, from a ventilating standpoint, are the nearest to perfection as ever obtained in this Machine Room, and the economy is apparent, as no live steam is used to obtain the results.

We are all familiar with standard practice of machine room ventilation, or, more or less familiar, as this problem has been a difficult one, especially in mills located in the north country where the atmosphere averages zero or below during the winter months.

The usual practice has been to heat fresh air from outdoors by carrying it over steam coils, blowing it into the room, and taking out the moisture from the dryers, either by having openings in the roof, or with exhaust fans. This system has been quite highly developed, and gives satisfaction, provided it is properly installed.

At the mill referred to, this old system was in use, but as the production was increased about 100 per cent, it was found to be inadequate. The matter of supplying additional ventilation was taken up, but as there was no surplus of boiler horsepower to be used in heating, and additional boiler horsepower was so expensive to install during the war, it was deemed inadvisable to put in the new equipment. After taking up the matter of using the waste heat for heating incoming air, with several concerns who would furnish ventilating apparatus of the standard make, but would not consider using the waste heat from the dryers, the writer got in touch with Mr. Briner. It was pleasing to find Mr. Briner had been working along these lines, and felt he could build an economizer to heat fresh air with the waste heat from the dryers. Unfortunately, during the war it was impossible to get material, so the installation was delayed about one year, and just put in operation this fall. The results are entirely satisfactory.

We are now ventilating our machine room with two fans. One exhaust fan is used for pulling moist air out of the machine hood to the economizer, and a supply fan distributes the warm air to various points in the room. The hot outgoing air and the fresh cold air criss-cross each other in the economizer without actual contact except through corrugated plates. The object of the corrugated plates is to enable the closest possible contact for transmission of heat from hot moist air to the cold fresh air, at the same time separating the moist air from the dry air. Both fans are belt-connected to a single 20 hp. constant-speed electric motor.

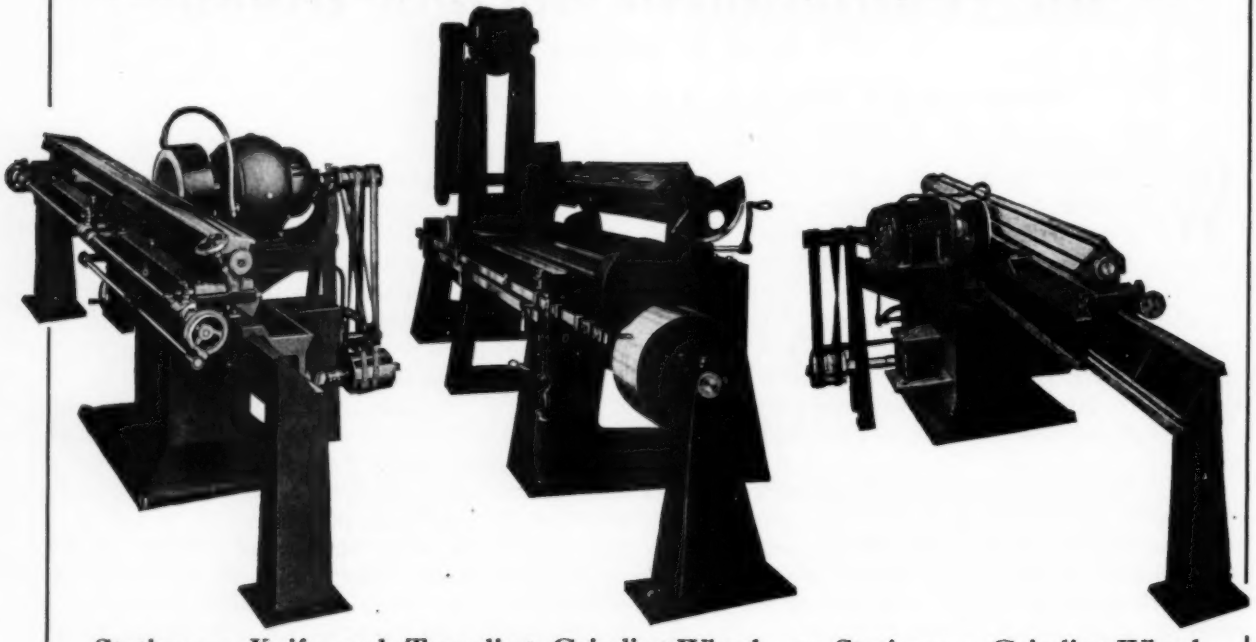
The test which follows shows that in average winter weather (34 degrees above zero) the economizer is able to raise the outdoor air to 107° Fahr. for distribution in the machine room in quantity sufficient for all ventilating purposes, and equivalent in heat units to 77 boiler horsepower continuously for twenty-four hours without the use of any steam whatsoever, either live steam or exhaust steam. This result is accomplished solely by utilizing the waste vapor going out of the machine hood and still leaving a large quantity of vapor available for other heating purposes.

It was found that 107 degrees was too warm for the comfort of the operators, and a certain amount of moist air was consequently allowed to escape into the atmosphere without passing through the economizer, so as to bring air temperature supplied to the room down to 98 or 100 degrees, resulting in a mean room temperature of about 80 degrees and 70 per cent moisture. Of course, on the underside of the roof where most of the hot air was distributed, the temperature was higher, about 90° Fahr. and quite dry, namely 50 per cent moisture, which is 20 per cent less moisture than is required for the growth of any of the roof-destroying fungi generally held responsible for so-called rotting and destruction of roof planks.

It is also interesting to note that as our heating medium or waste vapor is only at a temperature of 115° to 120° Fahr., a much milder heat is possible. This was taken advantage of by the use of about ten down-pipes carried to within four feet of the floor so as to provide fresh tempered air around shipping doors, doors to other departments and to certain otherwise wet points on the floor so as to keep floors dry.

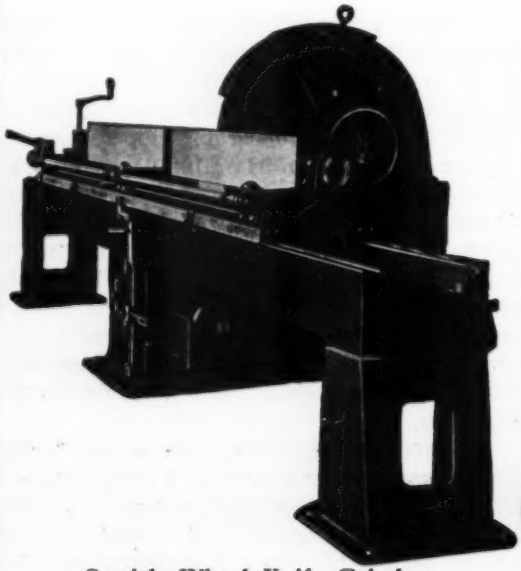
Room Condition: The following table gives a good idea of the room temperature and conditions as taken on the day of the test, December 17, when a light snowstorm prevailed outside under very moist conditions. It also must be remembered that in all proba-

Automatic Knife Grinders—Motor Driven

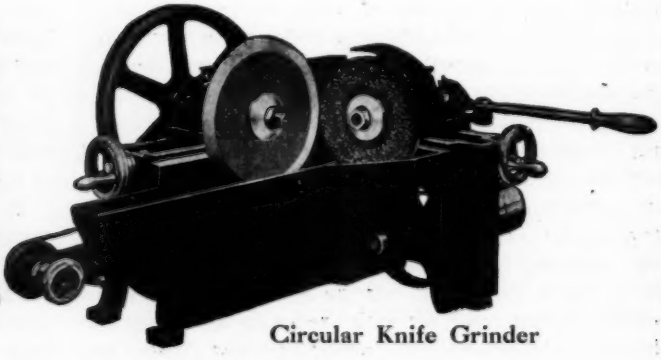


Stationary Knife and Traveling Grinding-Wheel, or Stationary Grinding-Wheel and Traveling Knife

All types of Knife Grinders for paper industries—Hand or Automatic, Straight Wheel, Cup Wheel, Ring Wheel Grinders: A machine for every purpose.



Straight-Wheel Knife Grinder



Circular Knife Grinder

Write for Catalog Showing Present Prices

MACHINERY COMPANY of AMERICA

BIG RAPIDS, MICH., U. S. A.

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bility there are very few machine rooms in the country as small as this room in proportion to the output.

	Temperature F.	Per cent Moisture
At wet end of machine	78½	75
Opposite 10th dryer from wet end	86	63
Opposite 10th dryer from dry end	84	69
At finishing tables	75	74
Temperature out of doors....	34 Wet Snow Storm	

Fan Data from Test: At the time test was made, the exhaust fan was running at constant speed of 192 revolutions per minute and supply fan was running at 295 revolutions per minute and supply 29,000 cubic feet air per minute, raising it from outdoor temperature of 34° Fahr., to 107° Fahr., or a rise of 73 degrees. This figures out 77 boiler horsepower in heat units. If outdoor air had been zero or considerably below zero, the results would be still better as regards higher recovery of heat.

The outgoing moist air had a temperature of 117° Fahr., and a relative humidity of 96 per cent of complete saturation. After passing this moist hot air through the economizer its loss in temperature was 19° Fahr., or 98 degrees. Upon leaving the machine it contains approximately 29 grains water per cubic foot, of which 11½ grains were condensed in heating up the incoming air. Provision is made for carrying away this condensed water which is in reality pure distilled water and amounts to 300 gallons per hour in round numbers, this is further evidence of the authenticity of results obtained. The condensation of the vapor is the best evidence that the vapor has given up its heat to the incoming air.

Provision for Heating When Paper Machine is Not Running or Paper Breaks on the Dryers: A couple of auxiliary pipe coil fan heaters are provided in the installation for taking care of any possible heating load on Sundays or during a shut down. A thermostatic control set for 80° Fahr. was arranged for admitting live steam to those heaters if in severe weather the temperature of the supply air should fall below 80° Fahr. Thus far the economizer has proven so efficient in keeping well above the 80 degrees that the live steam valve is kept closed.

Originality of the Idea: So far as we know, this is the first practical use of the idea on a large scale for heating and ventilating a machine room without the use of steam from the boiler plant. By its means first class ventilation conditions are assured in a place that was formerly regarded as a very difficult and expensive operating problem. Of course, the intention is also to use such waste heat in some cases to assist drying operations in summer.

Horse Power in Heat Units Going to Waste from All Paper Machines: Throwing away all the waste heat of the drying process has been standard practice for years. At the present price of coal this practice will soon be regarded as crude engineering which must be displaced by something which is an asset and a producer and not a constant operating loss. We give below the surprising figures of the approximate amount of waste heat going out of roof ventilators over the dryers for machines of various output. We have expressed the heat units in equivalent boiler horsepower.

Tons of Paper per 24 hours	Waste Heat in Boiler Hp. Going out Roof Ventilator
10	50
20	100
30	150
40	200
50	250
60	300
70	350
80	400
90	450
100	500

A great many pulp and paper mills of today are operated by water-power exclusively or are run condensing. All their drying is done with live steam. Such live steam must be used with great economy.

Preliminary Nature of the Results

The figures given in this test were taken with considerable care, yet it is thought that they do not represent complete possibilities of the economizer, as future tests in colder weather might show. The results, however, were so important that it was thought advisable to give them out as indicating what may be expected along this line in the near future, at which time more complete data, illustrations, etc., can be presented. Other Briner economizers are under construction in Canada where they will be exposed to the severest climatic conditions.

In checking up our figures of heat gained through the use of economizer with heat absorbed from outgoing moisture we found that there was apparently five more boiler horsepower given up than we have claimed in this test. Our explanation of this is that some leakage of cold air into moist air caused it and so we have properly omitted the five additional boiler horsepower from the results.

With present experience to guide us, we can attain greater accuracy in future tests, as the heat gained for ventilation should be accurately accounted for by the heat lost in going through economizer.

Economy Effected: Every mechanical device must sooner or later face a commercial reckoning, so we will set down how much the equivalent heating and ventilation will cost if it has to be produced with live steam from boiler plant. Assuming a recovery of only 65 boiler horsepower, and a coal consumption of four pounds of coal per hour per boiler horsepower, with coal at $10 per ton as fired, we get

65 × 4 × 24 equals 6,240 pounds, or 3.12 tons
3.12 × $10.00 equal ..... $31.20 a day
Less electric current..... 5.00 a day
Net saving ..... 26.20 a day

Office and Works, North Philadelphia Station, P. R. R., Philadelphia, U. S. A.

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Inquiries solicited and given prompt and careful attention.

Specifications and estimates for paper and pulp machinery on either new or repair work cheerfully given.

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Method of Testing Color of Boxboard Half-Stuff

By R. W. STEVENS

NO matter how accurately a formula for color is worked out in the laboratory, it is almost impossible to determine just what shade you will have under actual manufacturing conditions unless some sort of a test is made. The following is an inexpensive procedure used by the writer on boxboard stock to determine the shade of color under actual paper-making conditions, and it has always proved very satisfactory. The materials used are few and very simple and can readily be obtained.

First, color the beater or sample of half-stuff as nearly to shade as possible, holding back, of course, a portion of the color so as not to get it too dark at first. Next, in a beaker of one or two pints capacity (an ordinary milk bottle will do) mix a very small portion of the colored stock with water until it is about the same consistency as the stock when it goes onto the machine. Holding a small piece of ordinary coarse burlap, about three inches square, flat in the palm of the left hand, and the beaker in the right hand, let a small quantity of the solution flow quickly onto the burlap at the same time giving it a very slight shaking motion. The stock will form on the burlap similar to the way it forms on the cylinder, when properly done. Taking and maintaining a hold on one corner of the burlap with the right hand, press the burlap against the web of paper while it is on the felt with the stock-covered side of the burlap against the sheet of paper. Releasing the pressure and removing the burlap (all of which must of course be done very quickly) will leave a so-called scab of the colored stock firmly adhered to the web of paper, and when cut out at the finishing end of the machine, the scab will give you a fairly accurate idea of your color. It is a simple matter then, if necessary, to add more color and repeat the procedure until the desired shade is secured. The best place to put the scab on is just after the sheet rounds the bottom felt tail roll before it goes between the top and bottom felts, but of course this is not always possible as nearly every machine is built differently. Again, the liner may be of such a shade of color that it will throw your calculations off and in this case the scab may be placed directly on the under side of the bottom felt before it goes onto the bottom liner or first cylinder mould. A little practice and study and you will be able to get scabs of good formation and color. It is well to put two or three scabs of each shade on the machine as one is not always good enough to be depended upon.

Most men would rather talk to a smart girl than to marry one.

Think it over. Fewer accidents in the mill and all will profit, says the National Safety Council.

A Helpful Report Blank

THE following comes to us from the Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich., which we believe will be helpful to other mills:

"If it's good for one business it probably has at least some points of merit for the other fellow.

"That's the thought of our president and general manager, Mr. Kindleberger, in regard to the simple

DAILY REPORT OF OFFICE

KALAMAZOO VEGETABLE PARCHMENT CO.

Date_____

Today Sales	
Total Sales to Date	
Total Sales Last Month This Date	
Total Sales Last Year This Date	
Total Collections to Date	
Deposit Today	
Balance Cash in First National Bank	
Due From Customers	
Accounts Payable	
Deposit In N. C. B.	
Balance Cash In N. C. B.	
Balance Cash In B. of M.	

daily summary blank attached now in use in our accounting department.

"The busy executive has by this blank the essential facts in concrete form for daily use and comparison. We gladly pass the idea along for the good it may do should you see fit to make any possible use of it."

A Steel-Bound Platform

THE steel-bound platform illustrated herewith is an extremely important unit of the lift truck system. Its remarkable strength, convenience, and its range makes it adapted to any kind of interior transportation. It is designed to cover every range of moving material systematically—light loads or heavy loads, bulky or compact loads.

With the wide-spread use of lift trucks for interior hauling came the need for a strong, light, long lasting, and standardized load platform—one that could be secured in sizes and types to suit any kind of product. So one of the largest manufacturers of lift trucks has developed this steel-bound platform.

Strength and simplicity are dominant factors in

Big Progressive Companies Find Saving and Satisfaction in Vortex Painting

WHEN we assure you that your factory painting can be done for 30 to 50 percent less cost, with a quicker and better job, we are only setting forth what scores of the largest industrial concerns in America have found true by actual test.

Of the first 100 companies to try the Vortex Plan of painting, at least half have names that are nationally known, such as the McCormick Harvester Co., the Hudson Motor Car Co., the Grasselli Chemical Co., the New York Central Railroad, The Hinde & Dauch Paper Co., the White Co., to recite only a few of many who might be named.

Is it because the big company is keener and quicker to see merit in an improved product and an improved process?

Whatever the reason, the large and satisfactory use of Vortex Painting by the Industrial leaders is our recommendation to you.

Paint with your own labor, but with Vortex Paint and Vortex painting equipment. A demonstration will convince you.

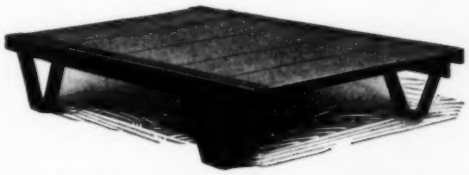
The VORTEX

An Air-Confined Paint Jet
NOT A SPRAY

The VORTEX MANUFACTURING CO · CLEVELAND · O

the construction of these platforms. They are a combination of hard oak top bound by steel rails and supported by forged steel legs locked together into one basic unit. This provides uniform strength. The steel-bound platform overcomes all the weaknesses of other platform construction.

It is a quick change to add any super structure to



the basic platform unit and readily convert it for the handling of various materials. It can be furnished in the box type, the sectional bin type, the stake type, table type, rack type, or any other design.

The broad face legs that cannot injure the floors and that have ample interval to ride clear of incline crowns and elevator crossings, bolts that do not bear on wood or work loose, and uniform clamping power the full length of the platform—these are typical of the many merits of this steel-bound platform.

Steam Pipe Insulation

NO engineer would think of using bare wires for carrying heavy electric currents: he would insist on their insulation. Yet there are cases almost without end where plants which are held up as models of efficiency, use steam pipes that are not insulated in the proper manner says the Scientific American. And just as electric current would leak in the instance of insulated wires, so do heat and steam leak or become weaker when carried through uninsulated pipes.

There is no excuse for uninsulated steam pipes at this time when, on the one hand, coal is selling at exceptionally high prices, and when, on the other hand, fuel engineers have made such a thorough study of heat insulation. Two symptoms, we are told by heat insulation engineers, always signal heat loss from a steam pipe. One is lowered pressure in the pipe, the other is high temperature of the air surrounding the bare or poorly insulated pipe. Obviously, this falling pressure or surrounding heat means that fuel in the form of heat is being wasted. Pipe insulation is necessary.

An insulation to be of maximum value must have more than the property of preventing heat loss. It must also have physical durability, for a short-life material means early replacement, so that if insulation values are equal, the most durable insulation is the most economical. A number of heat-insulating materials are now on the market, and companies producing these materials have a staff of engineers who specialize in problems of this kind. Both indoor and outdoor installations, overhead and underground, and every other condition can be met by consulting the heat-insulating engineers.

Suitability of Southern Woods for Pulp and Paper Manufacture

IN THE South, there are large stands of various species of pines including longleaf and shortleaf yellow pine, scrub, pitch, loblolly, etc. These woods are characterized by having a good fibre length. However, on account of their pitch content, it is not believed that they can be reduced by either the sulphite or ground wood processes of pulping to a grade of pulp to compete commercially with that made from northern non-resinous long-fibred, coniferous woods, such as spruce, balsam, or hemlock.

The various species of southern pines can best be reduced by the sulphate, or kraft, process of pulping, and the resulting pulp utilized for the manufacture of kraft wrapping paper or high test container board. These pines can also be reduced by the soda process, and the resulting pulp utilized in the manufacture of grades of paper in which sulphate pulp is ordinarily used. It is possible that further work will demonstrate the feasibility of pulping these pines by the sulphate process, bleaching the pulp to a satisfactory degree of white and mixing it with short-fibred sulphate or soda pulp made from other southern woods, such as the gum woods, for the production of magazine, book, envelope, or lithograph papers. The yield of pulp by the soda and sulphate process is less than 45 per cent.

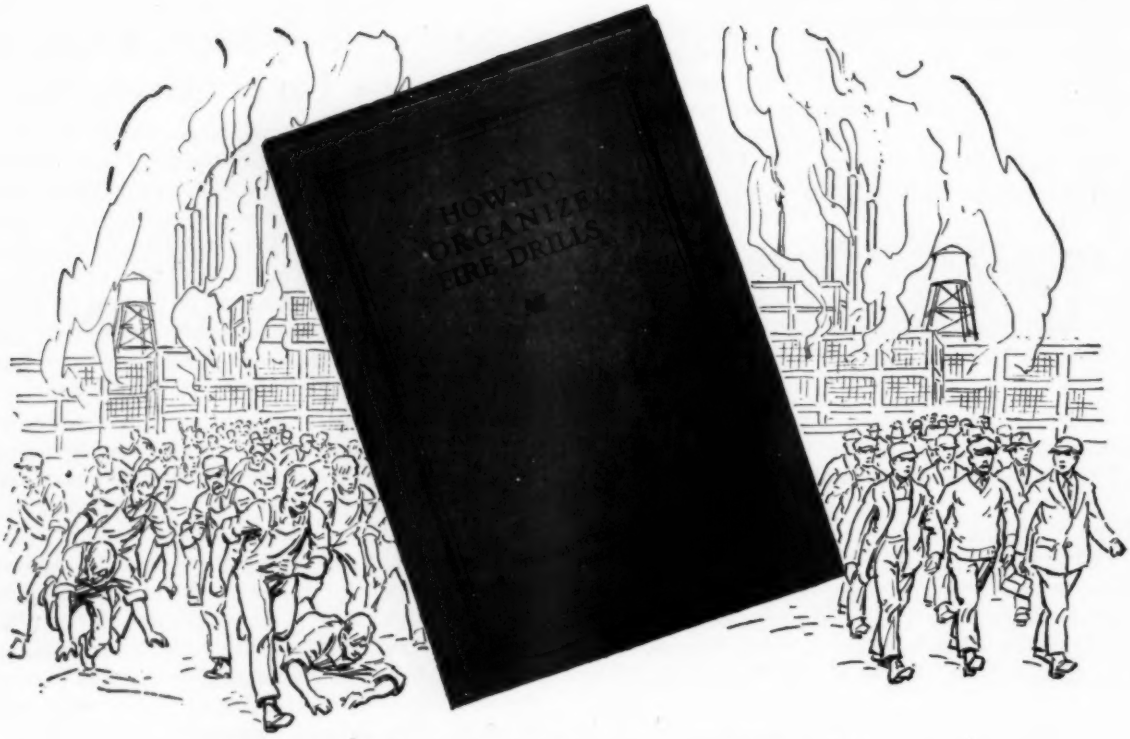
The large stands of hardwoods occurring in the South, consist in part of the various species of gum wood, cotton wood, sycamore, basswood, magnolia, willow, etc. All of these woods are short-fibred and, according to laboratory experience, can be most satisfactorily reduced by the soda and sulphate processes of pulping. This pulp after admixture with a longer- and stronger-fibred stock, such as bleached spruce sulphite, or pine sulphate pulp, can be used for the production of book, envelope, or lithograph paper.

Smoke Prevention

Emission of black smoke from stacks is a sure indication of waste. Prohibiting this smoke will result in proper firing methods, which will reduce the waste of fuel. The demand should be to stop hand-firing of boiler furnaces and other furnaces where capacity is beyond the reserve capacity of the equipment.

"All the others can sing," he dolefully said,
"All the others can sing," said he.
So he sat and drooped. But as far and wide
The music was borne on the air's warm tide,
A sudden thought came to the sad little bird,
And he lifted his head as within him it stirred;
"If I cannot sing, I can listen!" he cried,
"Ho, ho, I can listen!" he cried.

—Julia C. R. Dorr.



Protect Your Employes and Factory Against Fire Loss

Every 56 seconds there is a fire—1500 fires every 24 hours.

Five hundred of these fires occur in factories and loft buildings, taking their toll of human life and throwing hundreds out of employment. Yet many of these fires could have been prevented or stopped had the employes known what to do.

The Autocall Company believes that this appalling fire record can be greatly reduced, and to this end has issued a book of interest to every manufacturer, "How to Organize Fire Drills."

This book explains in detail how employes can be trained to act promptly in an emergency; how, through organization, lives can be saved and property damage prevented by instructing workers how to cope with the unexpected blaze.

It has been printed for your benefit and, as the edition is limited, it is suggested that you write today for your copy. It will be mailed without obligation to you.

The Autocall Company

211 Tucker Avenue Shelby, Ohio

"THE MECHANICAL FINDER OF MEN" (59)

Conserves Time for Executives

Autocall

Improves Telephone Service

Industrial Fire Alarm and Special Signalling Systems

Fire, the Waster

By FREDERICK WEBBER SHAFER

ONE day I accompanied a newspaper reporter while he got his material for the story of one of the worst fires that ever raged in Chicago. While we hung to the rear end of that speeding fire truck—I with both hands gripping tight—he managed to fish out a cigaret and light it, just as the whole ride were little more than a casual happening.

"Get much of this, Jim?" I asked as we slowed down for a corner.

"I'll say I do," Jim answered me. And, after he had turned his story over to the City editor and we drank big cups of hot, black coffee in Stillson's coffee shop, he said, "Do you know that more than 1500 buildings burn every day in the year?"

Fifteen hundred buildings! It took my breath away. And that started me on an investigation that since has proved to be a subject of gripping interest.

Just last week, while reading over my notes on this all-absorbing subject, I found these items:

Electricity	$84,086,471
Matches, smoking	73,474,348
Defective chimneys and flues	56,650,915
Stoves, furnaces	55,133,181
Lightning	39,828,389
Sparks on roof	29,271,585
Fireworks	1,499,854

These were the staggering totals of fire losses covering the period from 1915 to 1920, as compiled by the Actuarial Board of the Underwriters.

This total fire loss is enough to build 283,275 new homes at a cost of $5,000 each, enough to house 1,416,375 people or more than are contained in the entire state of Connecticut. This sum would have constructed a macadam road 5 3/5 times around the world at the equator. It would have built four Panama Canals.

Oh, the utter, senseless waste of it!

Statistics show that more than 90% of all fires start from small blazes and are therefore preventable if proper steps at fighting them are taken at their incipiency.

If there had been proper organization of employes in industrial plants, these fires would not have raged, this gigantic national bonfire would not have taken its toll of the nation's wealth.

In this connection, it is interesting to examine the elaborate fire organizations of some of the greatest industries, large and small in number of employes and buildings, in our country.

The American Multigraph Company, of Cleveland, has what is considered one of the most efficient fire-fighting organizations in the country. Its organization consists of a Fire Chief, a Fire Inspector, a Fire Captain for each department, a Scout for each floor, a Guard for each exit, an Extinguisher Leader for each department, and Extinguisher Squads for each department.

J. K. Wise, Employment Manager, is most enthusiastic over the great work of his Fire Department, and the employes themselves take to the work with a zeal that is indeed gratifying.

In the plant of the American Multigraph Company there is an elaborate system of interior fire alarm boxes, through which any employe can sound an instant, universally understood fire alarm, not only notifying squad leaders to gather their men together for an orderly exit, but also to warn the fire fighting units to assemble.

The exact location of the fire is determined by a code which sounds immediately after the general fire alarm rings. All alarms ring simultaneously throughout all buildings.

In commenting on the organization of his fire fighters, Mr. Wise said (in a letter written the manufacturer of this fire alarm system), "I want to say that with your help we have been able to install our fire drill system to the extent that it is working now, smoothly and satisfactorily . . . we believe that this has been more thoroughly understood through your assistance than in any other way."

It was also very interesting to me to read a letter written by the Mechanical Rubber Company, of Chicago, to this self-same manufacturer: "The fire occurred in our rubber roll department on January 26, 1921, at 2:45 p. m. The fire was a naphtha fire and was caused in the following manner: A large piece of rubber freshly cemented with rubber cement was lifted from the top of a zinc covered table, and as it was being lifted, it was slid along the top of this table causing static electricity which ignited the cement on the rubber sheet, also a can of naphtha, which was nearby on the table. An employe immediately upon seeing the flames broke the glass in the fire box.

"The company responded in 20 seconds and the fire was smothered with a wet blanket by one of our fire department members so promptly that the sprinkler head did not let go. The employes were exited from the plant in 2½ minutes."

Fifteen hundred fires every day! And every time I hear a fire alarm I cannot but think of the millions being thrown out of work, the economic waste, and last but not least, the appalling loss of human life in the great American bonfire.

Don't allow rubbish to accumulate. See that it is removed before quitting time, says the National Safety Council.

The Sign of Efficiency

MORSE DRIVES

The Sign of Durability

THE MORSE "ROCKER JOINT"

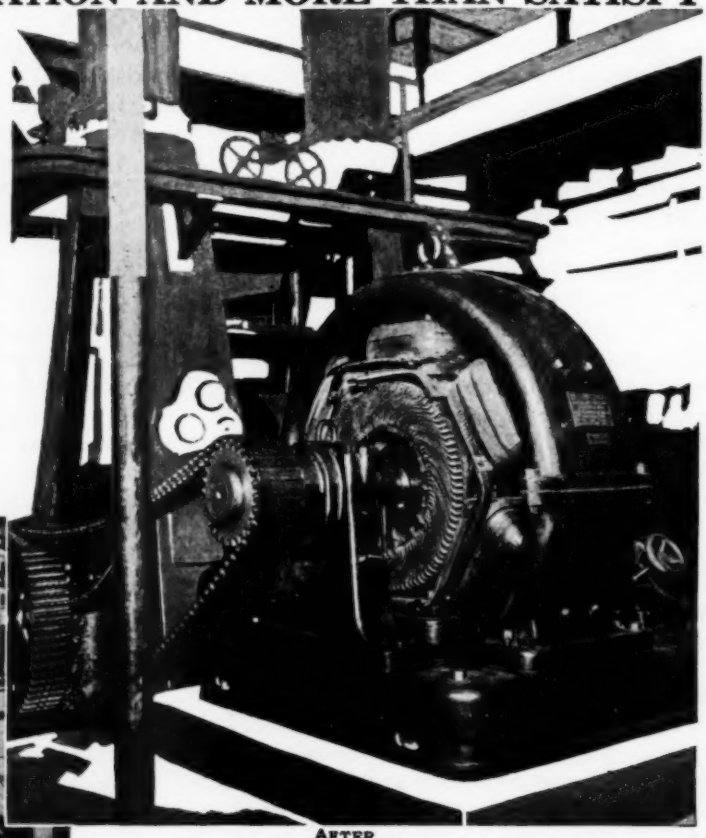
Positive as Gears

Flexible as a Belt

Longer Life

SAVED THE SITUATION AND MORE THAN SATISFY

PRODUCTION and Cost confronted this well known Meat Packing House in Baltimore. They contemplated taking out Corlis Engine driven Ammonia Compressor and installing a new direct connected set. The engineers consulted "MORSE ENGINEERING SERVICE" and thru the use of MORSE Silent Chain Drives, this expense was cut down, floor space saved, efficiency increased, and a still more satisfactory operating compressor maintained.



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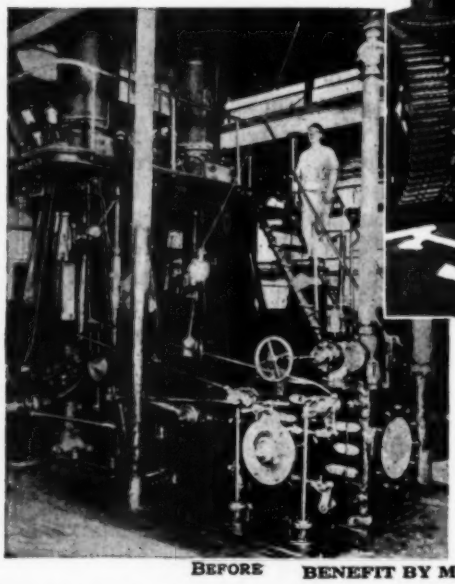

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No Slip, 98.6% Efficiency. Oil Baths not Required

Are you looking for improvement in power transmission, the saving of fuel, the saving of floor space by short centers, fixed speed ratios, improved quality, increased production, lower maintenance cost, longer life and dependability, the increase of profits now lost through slipping belts? Investigate MORSE Silent Chain Drives. Let MORSE Engineers give your conditions their careful research.

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CLEVELAND, OHIO.....Engineers Bldg.
DETROIT, MICH.....Cor. 8th & Abbott Sts.
CHARLOTTE, N. C....404 Commercial Bk. Bldg.
NEW YORK CITY
50 Church St., Hudson Term. Bldg.
PITTSBURGH, PA.....Westinghouse Bldg.
PHILADELPHIA, PA.....302 Harrison Bldg.
SAN FRANCISCO, CALIF.....Monadnock Bldg.
ATLANTA, GA., Earl F. Scott, M. E.....702 Candler Bldg.
CANADA.....Jones & Glassco, Reg'd.
MONTREAL.....St. Nicholas Bldg.
TORONTO.....Traders' Bk. Bldg.
KANSAS CITY, MO., Morse Engineering Co.....Finance Bldg.
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Report of Secy.-Treas. Hugh P. Baker

Forty-fourth Annual Meeting of the American Paper and Pulp Association

THE report of the secretary-treasurer of the American Paper and Pulp Association for the past year is to be less of a statistical report as to number of meetings held, number of publications sent out, number of visitors, which after all in a trade association may or may not mean very much—and rather more of a statement of tendencies in development in the work of the association, and a report on such accomplishments as may point out the work to be done the coming year.

When your officers decided to take a man as secretary who had not come up in the industry or in business, it took on certain responsibilities, possibly certain risks, in the way of developing a man as a secretary. The year has been one of instruction for your secretary, as it has been given up largely to learning the business of being a trade secretary.

The fact that this central organization, or parent association, of the paper industry has developed gradually into a federated organization, made up of twenty affiliated organizations or sections, and the fact that the association deals with the larger general problems of the industry, makes it more difficult for the secretary to establish a personal contact with men in the industry than is the case with the secretary of a service bureau who can establish contact with much greater ease and effectiveness.

It is out of the question for the secretary of the federated organization to know as much of the activities of each one of the groups, as the secretary of a particular group knows of his own activities. The knowledge which the secretary of the parent organization has of activities in various groups will be improved somewhat as there is developed a little more effective co-operation between the various organizations in the industry.

New Associations in the Industry

The articles of organization of the American Paper and Pulp Association state specifically that one of its principal functions is to bring about the organization of different groups in the industry and the development of these groups into individual association with their own secretaries. The carrying out of the first purpose of the association, as stated in the articles of organization, adopted two years ago, has brought us to the point where there is some considerable feeling that we are over-organized, as an industry. Your officers have exercised every reasonable care in the organization of new associations. One or two groups which have had organizations which have gradually become disorganized, have been urged to either put new life into the organization and make it worth while, or to wipe it off the slate. In one or two cases, small groups have organized independently of the parent association and have then come to the association for help and for admission to the federated organization. The association has responded cordially to appeals for help from all of the newer organizations, not only to carry out the articles of organization of the association, but to give the kind of service for which it exists.

By action of the executive committee of the association, two associate members have been added, namely, the Salesmen's Association of the Paper Industry and the American Pulp and Paper Mills Superintendents' Association. A new section of the association was formed at the fall business conference in Chicago, to develop information as to raw materials in the industry. This section is the Woodlands section, which has made a very satisfactory beginning under Mr. O. M. Porter, the assistant secretary of the association.

The Gummed Paper Manufacturers' Association was brought back into active existence at the Second Fall Business Conference in Chicago, and it is hoped that the meeting to be held this week will decide that it is to be permanent and that it is to give the service which an association can give such a group of manufacturers. During the late winter, the manufacturers of Glassine and Greaseproof paper, came together of their own volition and organized, and they are holding their first regular meeting this week in connection with other meetings of the paper industry. Some time later they may become members of the family of associations in the paper industry.

Committee Activities

The work of such an Association as this must be carried on more or less through either standing or special committees. It may be necessary to continue to have certain of the Association's activities taken care of by standing committees, but it is probable that more effective work will be done in the future through Special committees. Usually, in the development of the personnel of a standing committee, an effort is made to have various groups in the industry and different paper-making sections in the country represented. The result of such an effort is a committee made up of men of such diverse interests and so widely separated that it is difficult to bring them together in meetings or to get them to act separately through correspondence.

The arrangement made last year to have the Secretary of the Association secretary of each of the standing committees is desirable if for no other reason than that it gives the committee some one to turn to if results are not achieved.

The general effect of having a standing committee which finds itself unable to accomplish definite results during a given year, is unsatisfactory in that members of the committee are very apt to conclude and so express themselves that if the committee is not accomplishing results possibly the Association itself is not doing what it should do. It is probable that much better work will be done in the future by special committees appointed to accomplish a certain definite piece of work, and then to be discharged when the work is done.

During the past year, some very excellent work has been done by both special and standing committees. The Income Tax Questionnaire Committee was a special committee which began its work some two years ago, and completed the work with the completion of the Primer, which was printed and distributed widely.

The Tariff Committee, a standing committee, accomplished much in bringing all groups of the industry together for the presentation of a single report before the Committee on Ways and Means in Washington. The interests of various groups in the industry are not only diverse, but may actually be antagonistic at times, and in the case of the Tariff Committee, it was not the thought that the Committee should attempt to represent the industry or the Association by making certain definite recommendations, but rather that it should serve as a channel through which various associations might work together in the presentation of their respective interests at Washington. The Association appreciates the prompt way in which all of the affiliated associations concerned in the tariff activities met assessments for the expenses of the Committee.

The Committee on Forest Conservation has achieved really notable results during the past year. Their third and final report was accepted at the Fall Conference in Chicago, and they were authorized to make certain expenditures in the carrying out of their work. Their activities led very logically into co-operation with representatives of other wood-using industries and certain organizations dependent upon a permanent supply of paper so that during the past four months this Committee has been functioning through the National Forestry Program Committee. Mr. R. S. Kellogg, of the News Print Service Bureau, Secretary of the Committee on Forest Conservation of this Association, is Chairman of the National Forestry Program Committee, and has been one of the most active members of the Committee in the furtherance of such constructive legislation as that embodied in the Snell Bill.

The Committees on Industrial Relations and Education have had meetings during the year and have reached certain definite conclusions. The subjects covered by these committees are in a way so big and so general that a single small committee finds itself almost swamped by the attempts to accomplish results. More effective work can be done if these two committees are made much larger and then subdivided so that particular topics may be taken up by each of the sub-divisions.

The Committee on Foreign Trade has not had a meeting during the year, and yet its work covers a field which promises to be of increasing interest to paper manufacturers in the years to come. The Association should have much better information than it has as to foreign markets and as to the way in which the paper industry has been entering those markets. It may be that studies along the above lines can be made effectively by a Committee on Foreign Trade or pos-

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sibly if the Salesmen's Association of the Paper Industry should take on a permanent secretary or part of the time of a paid secretary, such a secretary could very logically include in his work with the Salesmen's Association a thorough study of foreign trade.

Funds for Outside Activities

At the close of the convention of last year, some thought was given to the development of the membership of the Association, and an effort was made to determine to what extent the industry had been or was being called upon for funds for activities outside of association work. It was found that the Joint Vocational Education Committee of the Paper Industry of the United States and Canada, had raised twenty thousand dollars in the United States, and ten thousand in Canada, for the publication of a series of text-books on the manufacture of paper. A second appeal had been made largely to paper manufacturers in the middle west to support certain investigational work of value to the industry being carried on by the United States Foreign Products Laboratory. A third appeal, and again a sectional appeal, had been made in Massachusetts for a small sum to carry on certain investigations which might lead up to the application of the activities of the Council of Management Education. It was found that the National Research Council was considering an appeal to the industry. In all of these cases the appeals had been made by those particularly interested directly to the manufacturers, without in any way considering the interests of associations in the industry.

Feeling that the American Paper and Pulp Association, the central organization of the paper industry, should be in a position to analyze the appeals for funds coming from outside the industry, and possibly thereby saving manufacturers both time and money, an effort was made to have those who were appealing to the industry, work through the Association. In carrying this out, the representatives of three different activities appealing for funds presented their particular activities at a meeting of the Executive Committee of the Association at the Second Fall Business Conference, held at the Congress Hotel, in Chicago. These three statements, with some of the discussions which followed, were printed as Special Report No. 1 of the Association, and given wide distribution.

There is a danger in the Association passing upon appeals for funds. When the Association investigates an activity desiring support and finally passes favorably upon that activity, it seems to assume, in a way, some obligation to assist in the securing of funds. This means that it would be easy for members of the Association to feel that too many appeals for funds for association work and for outside activities come through the Association. This can be corrected by the Association taking the stand that it shoud have no part in the collecting of funds for an activity even though it has passed favorably upon such an activity.

Meetings, Conferences and Publications

It would hardly be of interest to indicate the exact number of meetings held by the Association and its various committees the past year or attended by your Secretary and other officers of the Association. The accomplishments of the Association can hardly be measured by so many meetings and so many publications. The four quarterly meetings of the Executive Committee were held, and that with very pleasing attendance upon the part of the members of the Committee. Very full reports are made of all of the meetings of the Executive Committee and members are welcome to go over the minutes of the meetings at any time.

The first Fall Business Conference held in New York, in November, 1919, was so successful that a second Business Conference was held in November, 1920, and because of increasing membership in the Association from the west, the meeting was held in Chicago. The conference was unusually well attended, and it is believed that there are very many reasons why the Fall Business Conference should be held regularly in the west.

An important question with your Secretary when he came into the Association last Spring was as to methods used in maintaining contact between the offices of the Association and its membership. Indirect contact was being maintained largely through circular letters. Feeling that fewer circular letters possibly, or rather a series of circular letters brought together in one publication might be read a little more generally, it was decided to issue a monthly bulletin, confining that bulletin to four, eight or twelve pages. The publication of the bulletin was begun in June, 1920, and it seems to be giving service in the way of contact between the Association and the industry. Now that an informational service has been organized, and a trained man put in charge of that service, it is hoped that the bulletin may be made a more effective means of contact with manufacturers. A number of special reports have been put out during the past year and it is the feeling of the officers that a well printed pamphlet is much more effective than a series of multigraphed letters.

Contact with Other Industries

Reference has been made several times in bulletins of the Association and elsewhere as to the desirability of developing satisfactory contact with other industries. The paper industry is a fundamental and a vital industry in the life of the country. It can no more live to itself than can our states live unto themselves alone, or can our nation erect barriers that will separate it from other nations of the earth. The more we can act with other industries in problems common to all of us, the more definitely we will establish satisfactory and helpful relations among the other great industries, and the greater will be the opportunity for service by the manufacturers of paper and the industry, to the State and Nation.

Very concrete evidence of the value of the Association working with other organizations of business men has been given us during the past year by the part which the President of our Association, and our two other delegates, namely, Mr. C. A. Crocker and Mr. A. B. Daniels, have played in the activities of the National Industrial Conference Board.

There has been much too general a feeling among paper manufacturers that the Chamber of Commerce of the United States could do but little for them. The Chamber is, after all, the one big organization of business men in the United States could do but little for them. The Chamber is, after can be of special service to manufacturers, namely, the Fabricated Production Department, and the Department of Natural Resources. it is to be hoped that manufacturers of paper generally throughout the country will take out individual membership in the Chamber and will work a little more aggressively through this Association in the development of the Chamber.

The men who have developed the paper industry are just as keen intellectually and just as effective as business men as those men who have developed other and larger industries. The entire industry will benefit by having the manufacturers of paper more active in national organizations dealing with problems common to all industries, such as taxation, tariff, education, industrial relations and foreign trade.

In the place of a half dozen men from the paper industry in attendance at annual meetings of the Chamber of Commerce of the United States, or of other national organizations, it is greatly to be hoped that we may have an increasing number representing us from year to year. It will be just as true in the work of our Association or in the industry as it is in any other of the organizations of men. That is, we will get out of organizations what we put into them. The paper industry needs men not only to pay dues in other national organizations but to take the time to be active in these organizations.

Co-operation with Forest Service

Co-operation with the United States Forest Service was begun some two years ago when a number of mills contributed liberally to the maintenance of certain lines of experimental work carried on by the United States Forest Products Laboratory, at Madison, Wis. There had been a one-sided co-operation in a way, even before that time, through the sending in to the Forest Service by paper manufacturers of statistics as to production and consumption of pulp, production of paper, etc. As the United States Forest Service is a technical organization, giving its attention largely to investigational work and to the administration of lands owned by the government, there has been an entirely different relation between this governmental department and the industry than beween certain other departments in Washington and the industry.

Co-operation with the Forest Service is being continued this year through subscriptions by the industry to the work of the Forest Products Laboratory. That this money subscribed by the industry for work by the laboratory has been spent to very great advantage to the industry will be demonstrated most effectively as soon as the report upon these investigations is printed and distributed to the industry.

Two years ago the Forest Service co-operated with Mr. R. S. Kellogg, of the News Print Service Bureau, in the development of statistics as to production and consumption of pulpwood and pulp in the United States. As 98 per cent of the paper manufactured in the United States is made wholly or in part from wood, it seemed much more logical, in view of the wider interests of the American Paper and Pulp Association, that when the time came for the next decennial study of the pulpwood and pulp industry of the country it should be carried on between the Service and the American

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Paper and Pulp Association rather than between the Service and the Newsprint Service Bureau, to which a small number of mills belong. Therefore, when the United States Forest Service and the Newsprint Service Bureau were approached in this matter both took a very fine attitude in turning the work over to the American Paper and Pulp Association.

The Association has assisted the Service during the past three months in the securing of data and just as soon as tabulations are completed by the Service the manuscript will be gotten into form by the Service, but the printing and distribution will be carried out by the Association. Conditions are such in the Printing Office in Washington that the results of this study might easily become ancient history before they could be published and distributed satisfactorily. The Association by standing the expense of printing and distribution will be able to put the results of the study into the hands of manufacturers in the shortest possible time.

Opportunity has come to the Association to print the results of investigations by Dr. Otto Kress and others at the United States Forest Products Laboratory, of the decay of pulpwood and pulp with methods of prevention. If the Technical Association of the Pulp and Paper Industry is not in position to print this bulletin it is hoped that the Association can do so as it can put the matter out in more complete form than will be done if published by the government. Furthermore, it can be put out promptly, thereby giving it greater value to the industry. The carrying on of such co-operative work involves a certain amount of expense. If the Association can secure the funds it is asking for this year, it can carry through these publications and others without difficulty, and that without cutting its activities along other lines.

Next Year

Coming into the Association last year, knowing very little of the industry itself and but few men in the industry, your Secretary has found it a real problem to get acquainted, to learn something of the industry, and to learn to carry on the activities of the Association. He appreciates very keenly the kindly and effective support given at all times by the President of the Association. The way in which the industry has accepted what the Secretary has tried to do, as well as some of his mistakes, has meant a great deal in his getting established and under way. It should be possible to do more effective work the coming year, as in a way a foundation has been laid for more constructive work, both as an association secretary and in carrying forward some of the newer pieces of work before the Association, such as the development of the informational service and the co-operation desired with other national associations.

The activities of the Association have been held back somewhat by lack of room for the Association. This problem seems to have been solved and with a little additional room the efficiency of the men representing you in the central organization in New York will be much increased.

Your Secretary appreciates very keenly the fine spirit of friendliness and aggressive support given him by the members of the Executive Committee of the Association, the secretaries of affiliated associations, and paper manufacturers generally. The close of the first year really convinces the Secretary that he has completed the rites of adoption by the industry. The close of the first year also emphasizes the fact that the Secretary is facing greater responsibilities, and it will be reasonable for the industry to expect more of him he second year than could possibly have been expected in the first year.

A feature of the annual session of the Association was a series of ten-minute talks by representative men in different groups of the paper industry on conditions prevalent in their respective divisions of the industry.

Ten Minute Talks

Book Paper

The first of these brief addresses was given by Freas B. Snyder, of W. C. Hamilton & Sons, William Penn, Pa., who represented the book paper branch of the industry. Mr. Snyder reviewed the trend of commodity prices for the past year, outlining how, as a result of various factors, prices advanced to unheard of levels, and then explaining, through the reciting of manifold reasons, why values suddenly collapsed and began to shoot downward. He stated that the year 1920 witnessed demand for book papers at the highest pitch ever before known at one time, while late in the year demand subsided to about as low a point as it has ever been before. He said that book paper mills during the past six months have been running in intermittent and spasmodic fashion, and estimated the loss in production from normal output in the first three months of the current year at 90,000 tons. He stated that the production today is averaging only about 40 per cent of capacity, and asserted that merchants' stocks of book papers on January 1, 1921, were 120 per cent of normal. Book paper mills, he declared, have, on an average, but eight days' orders on hand at present, while holding about twelve days' supply in stock. Printers, he said, are buying in hand-to-mouth volume, and he expressed the belief that demand for book papers would undergo further reduction during the next several months if the threatened strike of printers goes into effect on May 1. He closed by saying that the best opinion in the book paper trade was that market activity would not revive before September 1 next, and that business would be spotty for the balance of the year.

Newsprint

Philip T. Dodge, president of the International Paper Company, New York City, gave a highly interesting talk on conditions prevalent in the newsprint paper market. Mr. Dodge emphasized that now is the time for paper manufacturers to keep cool heads and to keep their "feet on the ground." He declared that the successful man in the near future would be the one who watched closely for indications of changes in the commercial world, and who took advantage of improving conditions as they develop. He attributed the present state of the newsprint market largely to newspaper publishers, who, he said, bought heavily and stocked up paper during the boom period last year, and then, when the market eased up, threw much of these stocks onto the market. He stated that lower paper prices could not be put into effect by manufacturers until production costs are reduced through the cutting of wages. He referred to the new schedule of wages adopted by newsprint manufacturers, and said with pointed emphasis that unless the employes of the International Paper Company agreed to accept the reduction that his company "would shut down every one of its mills, and keep them shut." Mr. Dodge said that he expected a very considerable improvement in business conditions during the forthcoming year, and pleaded with the assembled paper manufacturers to practice co-operation to a fuller degree than they have ever heretofore.

Writing

C. A. Crocker, of the Crocker-McElwain Company, Holyoke, Mass., representing the writing paper industry, said that present business conditions are analogous to those existing in 1917 following the well-remembered boom caused by speculative buying of various commodities. He cited figures showing that orders for writing papers in the year 1917 were about 74 per cent of mills' capacity, in 1919 about 90 per cent, and in 1920 approximately 80 per cent. He expressed the hope that orders during the current year would reach an average of 75 per cent and stated that there were numerous indications tending toward the belief that they will. He reviewed the writing paper situation all during the past year, telling how demand and prices had been almost constantly on the decline since June, 1920, but stated that indications pointed to a fair revival of business by the middle of the coming summer, although saying he did not expect a full revival of activity for some time yet. He stated that present average prices on writing papers were 130 per cent above pre-war levels, but gave figures showing the extent of the decline in recent months from the high points reached in 1920. Mr. Crocker closed his talk with a personal appeal to members of the American Paper and Pulp Association for closer co-operation, for fuller and heartier support of the organization; outlining the benefits to be derived from the association by the individual, the whole membership and the industry at large.

Cover

On behalf of the cover paper branch of the industry, Frank E. Taylor, of the Taylor-Logan Company, Holyoke, Mass., stated that while there were no definite records showing the date on which cover papers were first manufactured in the United States, he knew for an established fact that one concern in New England had been making good cover paper since 1848. He stated that one of the principal reasons for the prevailing dullness in the cover paper trade was the high cost of printing; that he had been advised by many printers and catalogue publishers that they had numerous orders on file, but that these orders were being held up because of the excessive cost entailed in producing catalogues and similar printed matter. Orders for cover papers within the last five weeks, he stated, had been running a little over 50 per cent of normal. Prices on cover papers are at present ranging about 100 per cent above pre-war levels, which, he argued, were not too high in view of the large increase in production costs. He expressed the opinion that business conditions in the near future depend chiefly on the stability of prices, and

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he urged paper manufacturers to exert every effort to bring prices to a level where they will remain fixed for a time, thus to encourage buying by consumers.

Grocery Bag

Representing the grocery bag branch of the paper industry, Herman Elsas, of the Continental Paper and Bag Mills, New York City, stated that the present consumption of paper bags in the United States is about 60 per cent of normal and about 50 per cent of the machine capacity of the bag factories of the country. He cited statistics showing that paper bagmaking machinery now in use from coast to coast has a total capacity for producing 36,000,000,000 bags annually. Mr. Elsas devoted much of his talk to the development of the paper bag, from the time the first paper bag was made up to the present, and exhibited samples of various types of bags from the old flat bag to the self-spreading square bag now in common use.

Card Board

G. Frank Merriam, of the Holyoke Card and Paper Company, Holyoke, Mass., speaking on card board, said that business at present in this branch of the paper industry was exceedingly quiet, current orders being barely 25 per cent of normal. He stated, however, that even this was an improvement over the last three months of 1920, when orders ran at 20 per cent or less of normal. All present buying by consumers and jobbers, he said, was against direct requirements, everyone considering it inadvisable to stock up board. He asserted that the stocks in merchants' hands and acquired by them some months ago would likely postpone trade activity for a time when consumers increased their buying, but sounded a note of optimism by saying that a consensus of opinion in the card board trade was that conditions were due for improvement soon.

Tissue

Frank L. Stevens, of the Stevens and Thompson Paper Company, North Hoosick, N. Y., representing the tissue paper division of the industry, outlined market conditions in this branch of the trade for the past year, touching on the rise and fall of prices. He said that a principal factor in the sudden change in the market following the war was the throwing on the market of a tremendous amount of tissue towels and napkins and toilet paper by the Government which had been purchased for shipment to the American army in France. As a result of this, Mr. Stevens said the tissue paper market experienced a break in the market a considerable time before other branches of the industry. Since January of the current year, he stated, business in tissue papers, especially coarse grades, has shown steady improvement and he said that tissue mills are now operating at about 70 per cent of capacity—probably the highest percentage of any other class of paper manufacturers.

Waxed

J. D. Goldberg, of the Hamersley Manufacturing Company, New York City, reporting for the Waxed Paper Industry, said:

"I believe that the Waxed Paper business is a surer reflex of the general condition of business throughout the country than would be indicated by most of the other lines of paper and for this reason—in times of industrial depression, such as we are now experiencing, the manufacturer, the retailer, the jobber, the consumer, the individual can and does curtail, voluntarily and involuntarily, the use of paper in many ways that are so plainly evident without being itemized or detailed, but the last resort to curtailing or reduction of expense in living is in food stuffs. As the greater part of our production is used for the wrapping up of food stuffs of various kinds, it would seem that when there is little or no demand for waxed paper, it must be an active barometer of stagnation in business.

"I recently had opportunity of interviewing a number of manufacturers of waxed paper and while certain divisions of some mills may be running spasmodically almost up to normal, there is no steadiness of operation in a single plant, no life, no activity. I should say that 40 to 50 per cent would represent a fair and impartial figure at which to place the general average of conditions in the waxed paper business. Assuredly one-half of the mills running full time, and that without extended or forced production, could easily supply the demand for waxed paper that the country requires at present. We are meeting the same individual conditions that you gentlemen are up against and that is, that as business began to slow up, we had the usual—and what seems to be the natural—consequence of prices being cut below actual cost of manufacture in the frantic effort to stimulate business, but it is a truism that as a normal advance in price always creates a greater demand and shows a more healthy condition of business, an abnormal lowering of prices eventually halts the demand and limits the purchases that must be made to actual requirements from time to time, as they are needed."

Resolutions

At the afternoon session of the general association meeting the following resolutions were adopted:

1—Educational

WHEREAS, there is lack of readily accessible information relative to the paper industry as a whole, not only for the proper information of the general public but as between various groups within the industry itself, and

WHEREAS, there is need for a more general compilation of information from governmental and other official and reliable sources which can be made available for all branches of this industry; therefore, be it

RESOLVED, that the American Paper and Pulp Association by the establishment of an Information Service seeks to remedy this condition by effecting adequate means of collecting and distributing informative material of a general nature and about the industry, and be it further

RESOLVED, that the American Paper and Pulp Association, which seeks through this work to serve more effectively the paper industry, should receive the hearty and effective cooperation of its entire membership.

2—Transportation

WHEREAS, the prosperity of our country is inseparably bound up with the prosperity of our transportation system, and

WHEREAS, it appears that, despite burdensome and oppressive increases in freight and passenger rates, the earning capacity of our railroads is seriously impaired and their solvency is threatened, and

WHEREAS, the liquidation necessary to restore stability can make no distinction between prices, salaries and wages if it is to be effective.

Now, therefore, be it RESOLVED by the American Paper and Pulp Association, in convention assembled, that we commend the efforts of the American railway executives to effect more economical operation and to adjust salaries and wages amicably and fairly; and be it further

RESOLVED, that we ask the railway employes, union and non-union, organized and unorganized alike, both to consider the wage question with respect to their own best interests over a period of time rather than for the immediate present alone and to remember that their decisions and actions, more than those of any other body of employes, will influence the length of the business depression, now existent in our common country, and be it further

RESOLVED, that we urge upon the Railway Wage Board, the predominant importance to the whole country of an immediate decision on the questions coming before them for decision, hearing on rates of pay and practices which increase operating costs without a compensating return in work done, and that we express our confidence in the impartiality of their review of the facts, and their intention to serve justice and necessity alike.

3—Trade Customs

WHEREAS, the several divisions of the paper industry, with great labor and effort over a series of years, and, with the full cooperation of their merchant customers, have established and made effective certain trade customs, and

WHEREAS, these trade customs have proven beneficial and economical to the manufacturers, and distributors and the consumers of paper and its products, and

WHEREAS, the competition for business on a declining market may tempt overzealous manufacturers and merchants to waive these customs. Now, therefore, be it

RESOLVED, that we reaffirm our confidence in the fairness, utility and economy of well established and publicly recognized trade customs, and that we urge manufacturers and merchants alike to stand to the defense of these indispensable understandings in this time of trial and temptation, that they may find them unimpaired and more firmly established when normal conditions continue the demonstration of the desirability of their endorsement.

4—Necrology

The leaves from the trees of life, detached one by one, whirl with the early storms, or in their full splendor drift slowly down in the autumn of life. Since we last gathered here, the unending procession has taken up many who were dear to some of us, who have made our industry better for their contact with it, who have left the sweet fragrance of pleasant memories with their passing. Our sorrow is lessened with the knowledge of their greater happiness.

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ELBERT J. GEDDES, Secy. Central Paper Company, Muskegon, Michigan. The tribute of his friends is his unperishable epitaph.

GARRETT P. HYNSON, Secy. S. D. Warren & Company, Boston, Mass. Worthy representative of a company founded on and conducted by an ideal.

JAMES C. KERWIN, Pres. Riverside Fibre & Paper Company, Appleton, Wis. A justice of the Supreme Court of Wisconsin with an intimate knowledge of industry.

H. C. PETERS, Pres. Marcellus Paper Co., Syracuse, N. Y. A man of sound judgment, and a kind and considerate friend.

ARTHUR F. ROBERTSON, Secy. Treas., Albemarle Paper Mfg. Co., Richmond, Va. A man of splendid character and ability, who spent his long life in this industry.

K. C. SWEET, Sweet Brothers Paper Mfg. Co., Phoenix, N. Y. A big hearted man and a loyal friend.

J. P. SILL, Secy. Treas., Wausau Sulphate Fibre Co., Mosinee, Wis. An outstanding figure in the field of accountancy and management.

GEORGE C. SHERMAN, Pres. Taggart Paper Co., Watertown, N. Y. As old friends gathered about the fire in the evening, we speak of them as part of our circle, absent on a long journey.

5—Foreign Trade

Foreign trade is necessary to the continuous and profitable operation of our vast manufacturing industry. We accordingly commend the efforts of the National Foreign Trade Council to promote our commerce with other countries with particular reference to the development of long credit machinery with which to finance our immediate exports, the encouragement of imports to assure the future maintenance and increase of our exports, the continued employment of our merchant marine and the protection of American enterprise abroad.

6—Industrial Relations

The American Paper and Pulp Association depreciates in a time like the present, any efforts to curtail production by unduly shortening working hours or under this guise to secure increased wages, and we irrevocably record our belief that today's need is not more pay but more work.

7—Chemical Preparedness

WHEREAS, this country, desiring peace, cannot escape the necessity of adequate preparation for war, and

WHEREAS, the World War has demonstrated that in modern warfare, chemistry will be as dominant as it is in modern industry, and

WHEREAS, the synthetic dye industry is the backbone of the Chemical Warfare Service which so conclusively demonstrated its possibilities and efficiency; now, therefore, be it

RESOLVED, that we urge upon the Congress, and individually upon our own respective representatives, the favorable consideration of such legislation as will assure the continued growth, operation and control of a dominant synthetic dye industry, and be it further

RESOLVED, that we also urge adequate financial support of the Chemical Warfare Service both to protect the large investment of the Government in that division, particularly in the Edgewood Arsenal, and to keep our Army and Navy abreast of modern developments in this branch of the service.

8—Taxation

WHEREAS, the members of this Association along with all citizens of our country engaged in the industries are vitally interested in the question of the revision of the revenue tax laws, and

WHEREAS, it has been our privilege through our Tax Committee to be represented at the last conference of the enlarged tax committee of the National Industrial Conference Board; therefore, be it

RESOLVED, that we commend the Conference Board for their comprehensive investigation and exhaustive study of the Federal tax situation so fully set forth in their special Report No. 18, December, 1920, and that we concur in their findings:

1st—For the repeal of the excess profits tax.

2nd—For the reduction of the higher surtax rates.

3rd—For their plan for adjusting the net loss of any year by means of the profits of succeeding or preceding years and as these modifications of the present revenue laws will result in a reduction of the Government's revenue of about $800,000,000, be it further

RESOLVED that we strongly urge Congress now assembled to so legislate that the Government's expenditures shall be cut accordingly, feeling that this can unquestionably be accomplished by all reasonable economies, including the deferring of the enlarged naval program, and a too rapid reduction of our floating and maturing indebtedness, at least until the industries of the country have had a chance to readjust themselves to the new and rapidly changing conditions.

9—Association Officers

Emerson has truly said that "every great institution is but the lengthened shadow of a man." We, who hold this Association high in our regard, gratefully record its progress toward greatness as the projection of the energy, wisdom and devotion of George W. Sisson, Jr. Any formal expression is inadequate to convey our appreciation and thanks, but we know he will find his compensation in the knowledge of good work well done and in the place he holds in our hearts.

For little more than a year, the active administrative work has been in the hands of one who came to us not as a stranger but as a co-laborer in the field of forestry. We respected and admired him as an educator, but we have come to esteem him as a man and a friend. This Association extends to Dr. Hugh P. Baker its sincere appreciation of the loyal service he has devoted to its interests, and pledges its hearty cooperation and support to the continued success of his office.

Thanks are extended to the officers, members of the Executive Committee and of the many standing and special committees, who have added to the upbuilding of the whole.

Reports of Committees

The reports of the Standing and Special Committees follow:

The Tariff Committee

The Tariff Committee of the American Paper and Pulp Association, which is composed of the chairman of the tariff committees of the subordinate divisions of the paper industry, who are affiliated with the American Paper and Pulp Association, was appointed about two years ago, but until the change in the administration in Washington took place at the election last November, it had no particular duties to perform except taking note of the tariff bills which were introduced from time to time in Congress for special legislation affecting certain industries. None of these, however, had any direct connection with the paper industry.

With the change in the administration in Washington, preparations were begun for the enactment of a new tariff law and your Committee after a consultation with the chairman of the Ways and Means Committee of the House of Representatives immediately got to work.

Your Tariff Committee requested the sub-committees to give consideration to the rates as they affected their particular branch of manufacture, and to file with the general committee new schedules which would afford adequate tariff protection, and with the suggestion that the rates of the Payne-Aldrich Bill passed in 1909 be used as a basis.

Arrangements were also made with the chairman of the Ways and Means Committee that all changes in the new schedules should be submitted through your Committee only as the official representatives of the paper industry, and should that Committee require further information they would submit the fact to your Tariff Committee, who in turn would designate one individual from each branch of the industry who would furnish what was asked for. The recommended changes in the existing tariff law were prepared and compiled in one brief, which was printed and submitted to the Ways and Means Committee at a hearing held February 5th, in Washington. Copies of this brief have been sent to all the members of the American Paper and Pulp Association.

Our latest information is that the Ways and Means Committee have not yet given consideration to Schedule "M," which covers paper, but it is expected that in the near future the Ways and Means Committee will take up our schedule, and your Committee is prepared at any time for such action as may be necessary. The Committee requests that all manufacturers who are interested will read with care the proposed schedules and will welcome the suggestion of any changes which will clarify the meaning or modify the rates asked for.

The expenses of the Committee so far have amounted to about $750 which sum has been furnished by contributions from the various divisions which compose the American Paper and Pulp Association. These expenditures represent largely the cost of printing and brief filed with the Ways and Means Committee.

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The new tariff bill has not yet been considered by the Finance Committee of the Senate, but a similar course will be followed in presenting our claims before them as was followed with the Ways and Means Committee.

Respectfully submitted on behalf of the Tariff Committee,
HENRY W. STOKES, Chairman.

Committee on Industrial Relations

L. M. Alexander, chairman, made the following report:

Under date of September 16, 1920, your Executive Committee decided on making a selection for the Committee on Industrial Relations of the American Paper and Pulp Association, the only standing Committee which, up to that time, had not been duly selected and organized. The Secretary, Dr. Hugh P. Baker, notified the writer of the make-up of the Committee, which the Secretary has already announced to all the members of this Association, and I am taking the liberty of making the statement here as the report is read, if it should be called for in connection with the activities of the work of the American Paper and Pulp Association.

L. M. Alexander, Port Edwards, Wis., of the Nekoosa Edwards Paper Company.

R. Frank McElwain, Holyoke, Mass., of the Crocker-McElwain Company.

W. W. Sunderland, West Carrollton, Ohio, of the Miami Paper Company.

F. H. Macpherson, Detroit, Mich., of the Detroit Sulphite Pulp and Paper Company.

Ernest R. Behrend, Erie, Pa., of the Hammermill Paper Company.

Secretary: Hugh P. Baker, New York City, of the American Paper and Pulp Association.

I regret to advise you that we have not been able to have a full meeting of the Committee. Correspondence and a meeting of the Chairman and W. W. Sunderland in Buffalo on Monday, January 31, 1921, is the only meeting that has been held in any manner, either formal or informal. The withdrawal of Mr. F. H. Macpherson, of Detroit, Michigan, from activities in the paper industry shortened our Committee to that extent. The writer was fortunate enough to have conversations with several well-known men in the paper industry and discussed this question of Industrial Relations and it developed that not only members of the Committee, but others have generally made some sort of arrangement by which they had the confidence, co-operation and improved working conditions. It developed that there was a mass of ideas, varying to a considerable extent. After a careful canvass of the situation, the question which seemed to be most proper for early consideration was that which was formulated in a questionnaire which was submitted to all of the industry through its Secretary, and this will be the statistical report of Dr. Hugh P. Baker, Secretary, and constitutes practically all of the work actually accomplished by the Committee.

California, Florida and other congenial climes seemed to be the goal of practically all of the Committee, and the general plans being to go early in the Fall of 1920 and return as late as possible in the Spring of 1921.

Based on a general survey, it shows that not far from one-half of the manufacturing plants in the industry do not have and never have had any disturbances in its internal industrial relations, while the other part have had from minor to excessive difficulties, no matter whether the labor is organized or unorganized, whether the industry is operated under closed or open shop principles. This situation has greatly interested your Chairman and we believe other members of the Committee, to the extent that we think with proper meetings and consideration of this subject, we may be able to develop, for the benefit of all, methods applied that could help work for peace and harmony in the industry, so that advantage can be taken of this highly important feature of the paper industry.

The writer hopes to be able to meet with the Committee as a whole during the balance of the year, if it is decided by your body to have the Committee continued to do his share to promote the welfare and interest of the industry along lines that may be developed through careful analysis of the plans and procedure which it is hoped the Committee will have the privilege of investigating from time to time. Our Secretary will fully understand and explain in detail any questions answered as to what has been done thus far. I regret that the past six months has shown so little done along this line and that the writer cannot be personally present.

Work of Forestry Committee

No year in the nation's history has seen such marked advance in forestry as that just closed. No small credit for this advancement can be justly claimed by the American Paper and Pulp Association, through its leadership in formulating a national forest policy upon which widely different interests are now united.

A national sentiment for protection of the forests, which has been slowly developing for years, has now secured striking momentum and before another year is gone it can be confidently forecasted that there will have been adopted a national forest policy to provide a continuous supply of raw material upon which the paper and other industries depend.

Legislation, based upon the policies of this Association, as approved a year ago and further developed at its Chicago meeting in November, has been so generally accepted in principle that the Snell Bill, introduced in the last Congress, is now winning wide national support. The bill will be reintroduced without essential changes in policy in the next Congress by Bertrand H. Snell, from Potsdam, N. Y., who sponsored the bill when it was introduced at the last session.

The developments since November have been rapid. In December the National Forestry Program Committee was formed, with several notable national groups participating, to press the Snell Bill, approved by the United States Forest Service, for passage. The committee included the American Newspaper Publishers' Association, the American Forestry Association, the Association of Wood Using Industries, the National Lumber Manufacturers' Associations, groups of technical foresters and other national groups, all united on the Snell Bill as the best and most practical manner of solving this great national question.

This committee appeared in favor of forestry legislation before the last Congress and appropriations to preserve the forests and the Forest Products Laboratory were enlarged as a result of the need evidenced by the speakers for this committee, among others appearing for this legislation.

The Central States Forestry Conference, formed at Chicago in February to campaign for essentially uniform forestry laws in the eight lake states, was an outgrowth of the work of the National Forestry Program Committee, in its efforts to secure state as well as federal legislation.

State legislation is pending in many parts of the country, to tie up with the national forestry policy, and has actually been adopted in some states. New York's state legislature adopted a joint resolution endorsing the Snell Bill. Endorsements from a large number of business organizations, chambers of commerce industrial groups, Rotary clubs and the like have been given the Snell Bill.

Yeoman service has been rendered to the campaign by the American Newspaper Publishers' Association, which sent a speaker to Washington to appear for the bill, and which has conducted an extensive campaign of education not only among its own members, but among the members of other local daily and weekly newspaper associations.

Fifteen-Minute Talks

Reports on the activities of associate members of the Association were made in fifteen-minute talks on service by representatives of these associations.

Technical Association

Mr. R. S. Hatch, Hamersley Mfg. Co., Garfield, N. J., and President of the Technical Association of the Pulp and Paper Industry, read the following report:

"Mr. Chairman and Gentlemen: I am very happy to note that the term 'service' has been used in connection with these various associate members, because the justification for the existence of any organization is the measure of service which it can render.

"The Technical Association of the Pulp and Paper Industry is an organization of individuals, technical men, engineers and chemists, who are banded together in an attempt to give service to themselves and to the industry. Our membership includes not only the technical men in this country, but is fairly representative of the world. We have numbered among our members technical men from England, France, Canada, Sweden, in fact practically all of the civilized world.

"As you know, science is a universal language, and we must get our inspirations from other countries as well as our own. In that way we are an international organization.

"Now, as to the service which we have rendered and are trying to render to the industry, the success of any manufacturing industry depends upon how well that industry recognizes the natural laws upon which the industry is founded. It is the purpose of the technical man and the scientific man to search out those natural laws, place them in a position where they will be available to the industry, and couch them in a language which will be understandable. This work we are doing in our organization constantly. We are doing it for our individual mills and by assembling and getting reports

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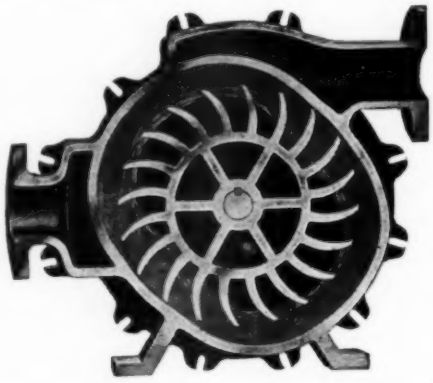

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on the work that is being done; we are disseminating that information for the benefit of the industry at large.

"I am not going to take much of your time in an endeavor to state specific things, with one or two exceptions. The Association has committees whose activities are directed along various definite lines of investigation. We are attempting to standardize methods of analysis of raw materials, so that intelligent specifications for the purchase of those raw materials can be issued. That is only one function.

"We are educating men in the processes of the manufacture of pulp and paper, we are taking men out of our technical schools and colleges and giving them the practical viewpoint of manufacturing, and from our membership are being taken the manufacturing executives of the mills in the near future.

Work of Educational Committee

"Perhaps the greatest undertaking which the Technical Association has attempted has been the work of the joint committee on vocational education. Some two and a half years ago, a joint committee of the Canadian Technical Section and the Technical Association of the Pulp and Paper Industry was formed, with the purpose in view of originating a course of education in pulp and paper manufacture which we could give to the workers in our mills, enabling those men to perform their duties with a higher state of efficiency, and to ultimately place the pulp and paper industry on a highly scientific basis.

"At that time, we little knew the task upon which we had entered. I have been talking with Mr. Wright of the Federal Board of Vocational Education recently, and he tells me that the task which we undertook has never been attempted before. No industry has ever attempted to formulate and get out a course of education in the technical and practical application of that industry for the working man.

"After two and one-half years of intensive work, the first volume of the course on vocational education has appeared. The second volume is about to appear shortly, and I could have had it here had it not been for the strike of the binders. The course is to be published in two forms—one in bound volumes, and the other in pamphlet form in which the volume is divided into chapters for greater convenience in class room work. We shall probably have the complete course in about a year from now.

"It has been very slow and difficult to get all this work out, because we had to take the men who were expert in their own lines and make authors out of them, and then that work had to be very carefully criticised and gone over by other experts in the same line, so that we were sure we had absolutely authentic information. The plans are now under way for the working out of systems of education in the various paper mill communities. So far we have the publications, but no method for systematic education.

"In this work we are working very closely with the Federal Board of Vocational Education, whose experience in that field is very large, and by the time we are ready to put this course into effect we shall certainly have some very definite schemes which will enable us to carry on our educational work.

"I wish to say one thing in connection with the work of the committee, and that is very important. Two years and a half ago, when this work was started, we had absolutely no basis upon which to estimate the amount of money we would need to carry on this work. After going over it as carefully as we could, we assumed that thirty thousand dollars would carry the work to completion. Twenty thousand dollars of that was asked for from the pulp and paper industry of the United States, and ten thousand dollars from Canada. The Canadian Pulp and Paper Association appropriated ten thousand dollars, and we succeeded in obtaining twenty thousand dollars by voluntary contribution from the various mills of the pulp and paper industry of the United States. At our annual meeting it became evident that we would need more money, to the extent of probably fifteen thousand dollars. This was brought to the attention of the Canadian Pulp and Paper Association at their annual meeting, and they have increased their appropriation fifty per cent; in other words, they have voted to give the vocational education fund five thousand dollars from Canada.

"We are not going to ask for ten thousand dollars from the United States mills, but we are asking for seven thousand, five hundred dollars. This work has got to be completed. It has gone too far to stop, and we have got to have the seven thousand, five hundred dollars. Rather, I will say we have got to have seven thousand dollars, because a manufacturer came to me this morning and said, 'I want to contribute to this splendid work. I want to give you five hundred dollars, and I want thirty copies of the course.' I am sure that was very heartening, and I only hope that the manufacturers in this country will be enough alive to the necessity of increasing the skill and knowledge of our employes, to contribute the rest of the seven thousand, five hundred dollars."

Cost Association

Mr. S. L. Bush, Chemical Paper Mfg. Co., Holyoke, Mass., and President of the Cost Association of the Paper Industry, gave the following report:

"Mr. Chairman and Gentlemen: About four years ago a few of the prominent men among the paper manufacturers with prophetic vision realized the necessity for more accurately compiled cost records as a stabilizing factor as well as an assistance toward more efficient manufacturing and merchandising methods, and saw the great possibilities in working together toward this end.

"Committees from several of the paper manufacturers' associations were appointed to work out definite suggestions for each particular group and a central committee of the American Paper and Pulp Association was formed, with Col. B. A. Franklin as chairman, to co-ordinate the work as far as possible. This activity finally assumed the proportions of a cost section of the American Paper and Pulp Association and two meetings were held, one in New York and one in Holyoke, Mass., which were very well attended.

"As the interest increased it seemed wise to form a more permanent organization, and at a meeting held in Buffalo in December, 1918, the Cost Association of the Paper Industry came into being, with a membership of about 25. The constitution provides for company membership with annual dues of $100.00 and we now have 120 members.

"Unfortunately the history of the growth of cost accounting in general has recorded experiences which have persuaded many to be overcautious in venturing to improve their cost records. It is of course essential that any manufacturer look upon the value of a cost system from the point of view of profit making and expense of installation and maintenance must be considered, but it is time to correct the impression which has always persisted in the minds of some that a cost system is an expensive bug-a-boo. This idea has persisted particularly in the case of small establishments where the keeping of necessary records is a simple matter, for the small manufacturer has been taught to think of properly organized cost records in terms of the elaborate detail required in larger establishments where it is necessary on account of the variety of product.

"Cost accounting in the paper industry has today advanced to the stage where if properly handled it can be rightly considered only as a very valuable and in most cases an absolutely necessary asset. To be entirely practical, a cost system must serve two main purposes: To make intelligent selling price estimates, and to assist in the economical operation of the mill. No paper manufacturer doubts the seriousness of a situation in which selling prices are made without full and accurate knowledge of the cost of manufacture. Many mills are today operating like ships without rudders, without knowledge of the effect of quotations on the one hand and of restricted operations on the other, and their progress, or more likely their retrogression, cannot be determined until the semi-annual or annual inventory is taken and the books are closed. Then the aggravating part of it is that no accurate knowledge is obtainable as to just exactly what happened to cause such astounding and regrettable results. You may say that before present conditions become history, we will all sell much paper at ridiculous prices, even below cost, and that just now cost systems are proving inadequate and are being actually disregarded. Perhaps that large contract for light weight or poor trim at a low price may be taken just now for the sake of running something, and it may be that the year's results will be such that you will be satisfied in having taken it. But can you afford to take a chance again? The answer can be given only with full knowledge of just what that particular order did to your profits or your losses and only accurate cost records can tell you that. It may be the essence of good judgment to quote ridiculous prices with full knowledge of the facts and the consequences, but such action without knowledge is the essence of foolishness. Yet manufacturers persist in being just that foolish.

How Cost Association Can Help

"A cost system can not and never will automatically change losses into profits. It takes brains to do that, but the brains of the management can not properly function without knowledge of current facts. It is that knowledge which a practical cost system supplies. But these statements are mere platitudes to you who say to us that you can not afford to install and operate a cost system because it is too expensive. We can be of service to you who take that attitude if you are only willing to spend a little time and thought with us. Perhaps you have a more liberal supply of time than anything else just now, but if you will spend a little of it in serious

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consideration of these matters with us we can show you how to turn it into money.

"But just how can we help? In the first place, we can very shortly teach you to think in terms of practical cost accounting. Altogether too few of the executives responsible for the guidance of the paper industry, are able to intelligently converse together on matters of manufacturing cost in mutually understandable terms, to say nothing of understanding the message of their own cost accountant and his records.

"The executive committee of the Cost Association has determined upon just seven fundamentals of a complete and practical cost system for paper mills. They are these:

A dual purpose,
Double entry control,
Unit cost,
Direct charging of materials,
Departmentalization,
Normal cost through budget system,
Departmental rate method.

"You can well afford to spend enough of your time and thought to become familiar with these and their application in a general way. A knowledge of the principles they represent means money to you.

"And then when you have learned to think in terms of practical cost accounting we can advise you as to the various methods by which you can best install or perfect your cost system. You may wish advice as to public accounting concerns, who have had sufficient experience in paper mill work to warrant your employing them. If so we can put you in touch with other mills where successful installations have been made. You may have in your organization through the advice of others who have perhaps had wider experience. If so, we would like to get acquainted, for we can help you. We occasionally hear of a capable accountant who would like to be connected with a live paper mill.

"Then again as your cost work progresses or after your installation has been completed, we will be indeed glad at any time to check it over with you and offer suggestions as might be helpful in making it of greatest use, or in further perfecting it.

"And finally, when your cost work is nicely under way, we can be of immense service to you by interesting and serving that other mill whose quotations do not seem to you to have been made on the basis of intelligent competition.

"Have we met with any success along these lines?

"We have.

"Testimonials of this success have come from individuals who have been assisted in their own plants through co-operation with us and from groups where many have joined together in the consideration and the working out of paper mill cost accounting problems. Such groups are now organized in seven different localities; in Wisconsin, in the Kalamazoo district, in the Miami Valley, in northern New York State, in the Philadelphia district, in the Connecticut River Valley and in the Berkshires. The meetings held by these local groups can be of increasing benefit to the men directly interested or in charge of the cost work in your mills, and you can not afford to have such men remain absent from these gatherings.

"We are making a serious attempt to be of more direct service to the mills in each general classification of paper manufacture by encouraging the group acceptance of more standardized cost accounting procedure. Much toward this end has already been accomplished in the writing paper group through a meeting called recently in Holyoke, where the basis suggested by the executive committee of the Cost Association upon which all writing paper cost systems should be built, was agreed upon and was recommended for the endorsement of an acceptance by the Writing Paper Manufacturers Association. Copies of these accepted suggestions can be obtained at the Cost Association headquarters and they are recommended to you for your most careful and thoughtful consideration.

"We are anxious to be of what assistance we may to other groups in this manner in the very near future.

"If you gentlemen will just step aside from your other perplexing problems long enough to carefully weigh with us the possibilities from this kind of activity, we are confident that you will find a means of relief from some difficulties which may now seem insurmountable.

"Time will not permit me to go further into details of the purposes and aims of our Association work and this is no place for a discussion of technical cost problems.

"We are at your service and our secretary-treasurer, Mr. Thomas J. Burke, with headquarters in Room 605, at 18 E. 41st Street, will be glad to hear from you and go into any of these matters in detail with you at your convenience.

"One more word I must leave with you. Mr. Burke and his assistant are the only paid members of our organization. The services of all others who are giving their time and energy to the work are gratis. The membership dues in the Cost Association, it must be admitted are nominal only, considering the value of such an activity in the industry. Such progress as we have made has been due to the efforts and the backing of a very few. The right kind of further progress can be accomplished only through greatly extended interest and backing on your part, both financial and moral.

"You who have good cost systems sometimes forget that it is almost as important in the successful conduct of your business that your neighbors have a cost system as for you to have one yourself. The idea of living to yourself alone on such matters has gone into the discard. You can well afford to have your cost accountant spending some of his time showing the other fellow how, and you who seek advice can not afford to miss the assistance of those who can and will help. Our Cost Association is the practical medium for such an exchange of helpfulness. If our effort is worth while it is about time for you to forget your excuses, so many and varied, and 'come across' with your membership fees, your influence, and your active assistance.

"We ought to have three hundred members today instead of one hundred, and we will have when you manufacturers wake up to the possibilities and the measure of collective success which should be yours when you recognize the importance of the work to the accomplishment of which our Association is committed."

Division Meetings

The first three days of the convention—Monday, Tuesday and Wednesday—were taken up almost entirely by meetings of the various divisions of the parent organization, the American Paper and Pulp Association.

Toilet Paper Converters' Association

At the annual meeting of the Toilet Paper Converters' Association, which was the first of the divisional meetings and which was held in the East Room of the Waldorf-Astoria at 10 a. m. Monday, a general discussion of present manufacturing and market conditions took place, reports were rendered, and the following officers were elected for the ensuing year: President, E. H. Burton, of the A. P. W. Paper Company, Albany, N. Y.; Vice President, L. C. Jeffress, of the Wortendyke Manufacturing Company, Richmond, Va., and Secretary and Treasurer, Emmet Hay Naylor, New York. E. H. Burton, L. C. Jeffress, E. H. Benson, of the Regal Paper Company, Pulaski, N. Y.; J. M. Ross, of the Sauquoit Paper Company, Utica, N. Y., and E. C. Sloan, of the Foley Paper Company, Springfield, Mass., were chosen to compose the Executive Committee, while Mr. Burton was elected to represent the division on the Executive Committee of the American Paper and Pulp Association.

A lengthy discussion of price conditions followed the report of a member of how his wife had paid 2 cents per sheet to a retailer for the high-grade tissue paper which he manufactured and sold at $1.10 per ream of 480 sheets, at the annual meeting of the Tissue Paper Manufacturers' Association in the East Room Monday afternoon. The manufacturer in question remarked that "the taking of a profit of 400 per cent by the retailer is an outrage upon the consumer, for which the manufacturer is blamed, and for which he has no remedy. Many instances have been found in the last few months where retailers are holding up the prices of all tissues, towel and similar papers, when the mills are unable to get orders enough to operate their plants. The manufacturer has been willing to take more than his loss with the fall of prices, but he is entitled to demand that the retailer give the customer a fair deal, by making prices at a reasonable margin of profit."

Tissue Paper Manufacturers' Association

John Brannan, of the North End Paper Company, Fulton, N. Y., was elected president of the Tissue Paper Manufacturers' Association for the ensuing year. W. A. Wheeler, of the A. P. W. Paper Company, Albany, N. Y., was chosen vice president, and Emmet Hay Naylor was re-elected secretary and treasurer. The Executive Committee elected is comprised of Mr. Brannan, Mr. Wheeler and W. R. Robbie, of the Phoenix Paper Company, Greenwich, N. Y.; J. B. Rieg, of the Erving Paper Company, Orange, Mass., and P. S. Wagner, of the Northern Paper Company, Green Bay, Wis. Mr. Brannan will serve on the Executive Committee of the American Paper and Pulp Association.

Glassine and Greaseproof Paper Manufacturers' Association

That German manufacturers are endeavoring to forestall tariff action in the United States by raising prices to disprove the allegation that German competition is so low that

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"Eldorado"
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"SUPERFINE" No. 1 MIMEOGRAPH

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Americans cannot compete with them was disclosed at the annual meeting of the Glassine and Greaseproof Paper Manufacturers' Association at 10 a. m. Tuesday in Room 110 of the Waldorf. Since the American manufacturers asked for a protective tariff the German prices have been increased from 11 to a new level of 17 cents per pound, it was brought out. Meanwhile reports from the industry in the United States showed that mills are operating to a maximum of 30 to 40 per cent of full time. Officers were elected as follows: President, L. T. Stevenson, Mountain Mills Paper Company, Lee, Mass.; Executive Committee, Mr. Stevenson, and J. D. Goldberg, of the Hamersley Manufacturing Company, New York City, and Carl Becker, of the Westfield River Paper Company, Russell, Mass. Mr. Stevenson will represent the division on the Executive Committee of the American Paper and Pulp Association.

Book Paper Manufacturers' Association

The Book Paper Manufacturers' Association met in annual session in the East Room at 10 a. m. Tuesday, and after the readering of officers' and committees' report, Grellet Collins, of the Dill and Collins Company, Philadelphia, was elected president for the ensuing year. A. H. Nevius, of the Miami Paper Company, Dayton, O., was elected first vice president, and A. L. Pratt, of the King Paper Company, Kalamazoo, Mich., was elected second vice president, while Emmet Hay Naylor was again chosen secretary and treasurer. Messrs. Collins, Nevius and Pratt, with A. Hollingsworth, of Tileston & Hollingsworth, Boston, and W. Randall, of the Champion Coated Paper Company, Hamilton, O., comprise the Executive Committee. Mr. Collins will represent the division on the American Paper and Pulp Association's Executive Committee.

Cover Paper Manufacturers' Association

F. E. Taylor, of the Advertisers Paper Mills, Holyoke, Mass., was elected president of the Cover Paper Manufacturers' Association at the annual meeting of that organization in the East Room Tuesday afternoon. D. L. Quirk, Jr., of the Peninsular Paper Company, Ypsilanti, Mich., was elected vice president, and Emmet Hay Naylor was made secretary and treasurer. The Executive Committee chosen is composed of Mr. Taylor, Mr. Quirk, and C. S. Boyd, of the C. S. Boyd Paper Company, Appleton, Wis. Mr. Taylor will serve on the Executive Committee of the American Paper and Pulp Association.

Gummed Paper Manufacturers' Association

The Gummed Paper Manufacturers' Association which met Wednesday afternoon, discussed the question of whether the organization should disband or make the association a working functioning body, and decided that present conditions demand a closer understanding of business problems by business men, and determined upon a more definite organization than it has been in the past. Affiliation with the American Paper and Pulp Association was voted, and C. H. Crowell, of the Crowell Corporation, Brooklyn, N. Y., was named president with authority to appoint the Executive Committee. O. M. Porter was made secretary.

Glazed and Fancy Paper and Cardboard Manufacturers' Association

At the annual meetings of the Glazed and Fancy Paper Manufacturers' Association and the Cardboard Manufacturers' Association it was decided to make a more definite organization of their respective lines of manufacturers, and for the present O. M. Porter will serve as secretary and treasurer of both associations. It is probable that both organizations will follow the suggestion made in the annual report of Dr. Baker and unite with other similar smaller groups of the industry in the naming of a joint secretary to be placed in the general offices of the American Paper and Pulp Association. No formal action was taken, but this was said to be the plan under consideration in both associations.

Manufacturers of mill bristols at their meeting Tuesday afternoon discussed a tentative formulated trade customs to apply to that branch of the industry and relating to sizes, weights, special colors, packing, claims and the like.

Writing Paper Manufacturers' Association

The annual meeting of the Writing Paper Manufacturers' Association Wednesday morning in the East Room was largely attended, and the election of officers resulted in Norman W. Wilson, of the Hammermill Paper Company, Erie Pa., being chosen president. Alfred Leeds, of the Writing Paper Manufacturers' Association of Springfield, Mass., was elected first vice president, and Fred A. Leahy, of the Eastern Manufacturing Company, Bangor. Me., was elected second vice president, while Emmet Hay Naylor, New York, was again named secretary and treasurer. Mr. Wilson, Mr. Leeds, and W. C. Wing, of the Fox River Paper Company, Appleton, Wis.; Norman Bardeen, of the Lee Paper Company, Vicksburg, Mich., and W. M. Crane, Jr., of Crane & Company, Dalton, Mass., were selected to compose the Executive Committee. President Wilson will serve as a member of the Executive Committee of the American Paper and Pulp Association.

Pulp Manufacturers' Association

At the annual meeting of the Pulp Manufacturers' Association on Tuesday afternoon, Henry W. Stokes, of the York Haven Paper Company, Philadelphia, was elected president for the ensuing year, and L. M. Alexander, of the Nekoosa-Edwards Paper Company, Port Edwards, Wis., was chosen vice president. The Executive Committee elected consists of E. W. Kiefer, of Port Huron, Mich.; D. C. Everest, of Wausau, Wis., and Alexander Calder, of New York City.

Woodlands Section

That efforts of paper companies to protect their forests from fire are in many cases handicapped by the refusal of workmen to do the work required in destroying rubbish was the statement made by Ellwood Wilson, forester of the Laurentide Company of Canada, in discussing the problem of slash disposal at the annual meeting of the Woodlands Section of the American Paper and Pulp Association. Extensive experiments have been made, he said, in the best means of protection of the remaining forests from fire by careful cutting, and burning the tops was found most effective.

"A great difficulty," he said, "is the opposition of the men doing the work to go near the heat and sparks from the fires in which the brush is burned, even though desired by their superiors. This can be overcome by piece work, with a bonus, and proper supervision."

T. W. Dwight of the forestry branch of the Canadian Department of the Interior recommended burning of brush to eliminate the fire menace, and said that in the Canadian prairie provinces, disposal resulted in protection from fire, the securing of more material and a smaller waste, and increased ease in getting out the cut timber. His conclusion was that brush burning is not prohibitive in cost. The Bathurst Lumber Company of Maine reported that the cost of burning brush on an experiment made on 297 acres, was four times the cost of "lopping" the tops of trees to facilitate the disposal by normal decay of small branches.

A report on tractors for hauling pulp wood based on a 320 acre experiment in Minnesota showed that a ten ton tractor with a train of wheeled wagons did the work of 36 horses, and a 5-ton tractor of 16 horses. For the same amount of work, the tractor cost was $3,150, as against $10,137 for the horses, and the tractor initial cost was $2,000 under that of the horses.

The Woodlands Section before adjournment adopted as its program for the coming year an important campaign of work, chiefly to include the making of a study of costs and yields secured by reforestation as regards pulp wood, both with relation to natural and artificial reproduction. An effort will be made to secure the co-operation in the field of the United States Forest Service.

Officers of the Woodlands Section were elected as follows: Chairman, D. A. Crocker, of the Eastern Manufacturing Company, Bangor, Me.; Vice Chairman, C. M. Hurtubis, of the Hammermill Paper Company, Erie, Pa., and Secretary, O. M. Porter.

Banquet

Not quite twelve hundred members and guests, exceeding by a hundred or more the largest attendance at any previous similar function, were present at the annual dinner of the American Paper and Pulp Association in the grand ballroom of the Waldorf-Astoria which brought the forty-fourth annual convention to a close on Thursday evening. Virtually every foot of room in the spacious room, including both tiers of balcony boxes, was necessarily utilized to seat this immense gathering.

During the serving of dinner, consisting of a sumptuous repast of nine courses, with table water and ginger ale—a Pepperhill product—furnished by the Pepperhill Card and Paper Company, of Pepperhill, Mass., a string orchestra rendered popular and old-time melodies, in which the diners joined in singing.

The speakers of the evening were Hon. Medill McCormick, United States Senator from Illinois, and Francis H. Sisson, vice president of the Guaranty Trust Company, New York. Following the delivery of his "valedictory" by toastmaster and retiring president George W. Sisson, Jr., in which he spoke at some length on the greatness of America, Mr. Sisson introduced Mr. Sisson, the banker. The latter's speech was

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a strong and masterful discourse on present-day financial and commercial conditions, in which he outlined the events and causes leading up to the prevailing period of business depression, and stressing some of the measures that should be adopted to bring industry out of the prevailing situation. Mr. Sisson was greeted with loud applause when he stated that "we have passed the crisis of the industrial panic brought about by the war," and that "we no longer stand at the top of the hill looking downward, but at the bottom looking upward." He declared that the manufacturer, the business man, the individual was today in a position to serve his country more than ever before by hard work, the practice of thrift, the allaying of fears of panic, and in similar ways. He mentioned the various matters, notably tax revision, labor, the transportation problem and the tariff, which Congress and the new Administration should and must take up to relieve the business interests of the country from the conditions now being experienced. His speech was a strong argument in behalf of capital, as well as labor, and he was frequently interrupted by applause from all parts of the dining hall.

A first hand word picture of conditions existing in Europe was painted by Senator McCormick, who recently returned from an extended tour of investigation on that Continent in an official capacity, in his speech. The Senator took each of the principal countries in Europe—England, Belgium, France, Italy, Austria-Hungary, and Germany—and treated with them separately, explaining in detail the economic, industrial and political situations in each land. Some of his descriptions of near-famine conditions in the Central European countries brought tears to the eyes of his listeners, while his humorous stories of occurrences during his travels were greeted with much laughter. After hearing him, one felt as though he had just returned with the Senator from his European tour, so realistic were his descriptions and in such detail did he explain the situations abroad.

Sixth Annual Meeting of the Technical Association

Held on April 11, 12, 13 and 14, 1921, at the Waldorf-Astoria Hotel, New York

THE large attendance at the annual meeting of the Technical Association of the Pulp and Paper Industry, held in the Waldorf-Astoria Hotel, April 11 to 14, in conjunction with the convention of the American Paper and Pulp Association, clearly attested to the growth of that organization during the past year.

The first general session of the Technical Association was held in the Myrtle room of the Waldorf at 10 a. m. Tuesday. After the calling of the meeting to order by President Raymond S. Hatch, who presided, an address of welcome to New York to the visiting paper and pulp mill men was delivered by Hon. Henry H. Curran, president of the Borough of Manhattan of the city of New York. Mr. Curran said:

Address of Welcome

"Mr. President and Gentlemen: It is the unfortunate lot of many conventions to have substituted in place of the casual and informal meeting of old friends, a set speech of welcome by one who has it in his heart to welcome you to everything that we have in New York, but at the same time a disposition not to detain you unduly from the pleasant part of the morning's purpose.

"In the old days it was the custom to extend and really give the freedom of the city—whatever that meant—to those who would arrive in the city and be our guests and friends for a time. That has rather fallen into disuse within the last week or ten days.

"In point of fact, although I had not the same authority which inhabits the embattled aldermen of this city in extending the freedom of the city to you, I am not sure that I would dare to do so. It might even be that somebody would at once rise to inquire—and I begin by naming the president of your association—by the question: Who is Hatch? Or possibly somebody might say: Who is Clark or Keenan? And I do not know whether the Hatch theory of relativity or the Clark or Keenan theory of relativity would save us from the dilemma in which we found ourselves among the city fathers a week or two ago.

"And then I notice in your pamphlet that you all come from well wooded and well watered districts of the interior, and the activity of our police department in the last few days compels the sad reflection that possibly you have come from one well wooded district to another part of the country which now abounds with well watered districts of the interior.

"It may be that there is something of a likeness between our city and your industry. Our principal trouble in a nutshell has been that we never could catch up with the increase of population, just as—and I am speaking as a greenhorn in the paper business, although I used countless reams of it in the days when I was a reporter—I take it you have never been able to really catch up with the consumption of paper in this country. In New York you will notice the skyscrapers. It may be picturesque to those who come from other countries, but they signify human misery in this city. They are the result of an insensate desire of everybody to do his business in the same place at the same time, and when the whole island was covered south to Central Park in Manhattan then the building had to go up in the air, and they were erected up into the air to meet the desire of everybody to do his work south of the City Hall, and of a sudden it was discovered that the streets would not hold all these people and a limit was put on the height of buildings.

"When you go to the theatre in the neighborhood of Forty-second street, you will find that everybody from all five boroughs, from Jersey and Connecticut and from every state in the country, insists upon going to the theatre at the same moment, in exactly the same spot, to wit, Forty-second street, and the worst subway crush of all is the theatre crush today with one hundred theatres in a small radius.

"So it seems to be an American habit or perhaps a peculiarly New York habit to insist—whether it is curiosity or whatever the human failing is—in being where we won't miss anything. Thousands who will gather over an active trench in Broadway are there and will stay there for hours, for they are afraid they will miss something in the delvings of the laborers below. And so we are all making certain to go to the theatre in the same place and at the same time, and to go to work at the same time and in the same place, and take the subways within the same radius of perhaps fifteen or twenty minutes in going to and from the curious things which in this town we call business and homes.

"In your business, with the size in newspapers and the use of paper increasing, public education increasing—the least that anybody does is read all the time, read newspapers and magazines all the time. No wonder I have felt desperate at times in trying to catch up with it.

"In New York we are trying to regulate the flow of population, trying to have them live near their work and work near their homes, trying to revive parts of this city that have fallen into disuse through these curious tides of occupation and residence. And perhaps I can just leave you this word of congratulation from a layman to those who are in the industry and know it because of a sentence I find in one of your papers which refers to what I have seen with my own eyes, and I wish I could see much more of it in the future, and that is the conservation of our forests by you who utilize them in the interest of the public.

"The splendid public spirit added to the distinct self-interest of taking the mature trees and planting new ones in their place. You have seen more than I have of that, and it reminds me of the condition to which parts of Europe have come where you will find an orchard or a grove of trees in France, and I was told that one of our regiments was unable to camp in a given orchard, because it would take two months to collect the permission from those who owned the grove of trees, each separate tree was owned by a separate family and some trees were owned through the course of devolution of title by four or five or six families, and it may be that years ago the superfluity of trees disappeared from the face of Europe, just as Buffalo disappeared from our plains fifty years ago.

"I think it is a matter of wonderful foresight, compared with the prodigal use we make of our American resources even for the best purposes, that you gentlemen have gone ahead and pioneered and made a real start in using trees as

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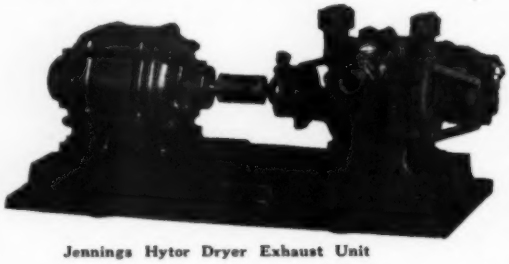

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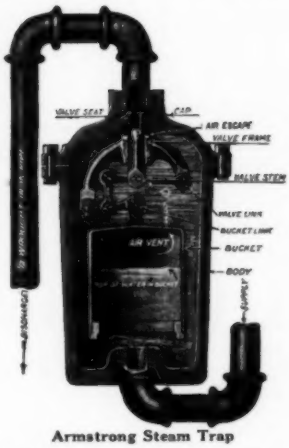
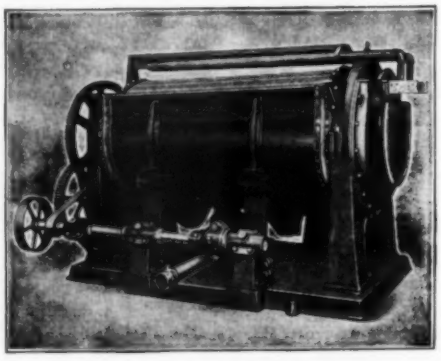
This consists of an individual Armstrong Steam Trap on return line from each dryer with main return header connected directly with the Jennings Hytor Dryer Exhaust Unit, insuring circulation and highest efficiency of dryers.



Armstrong Steam Trap



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It will unload and cord a car of pulpwood in a few swift "grabs"; when equipped with hooks or platform instead of bucket, it will load and swing big loads with speed and economy that will please you.

The "Auto-Crane" has a partner, the Byers Full Revolving Crane shown in the small illustration below. Both are thorough-going, dependable machines; both fit admirably into the requirements of paper-mill service. Write us about your problems—we will gladly send particulars.

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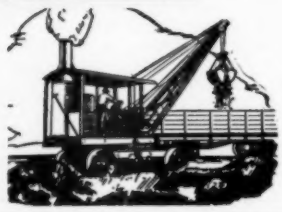
Weight—Without bucket, 13 tons.
Power—Customer's choice of steam, gasoline or electricity.
Mounting—Customer's choice of broad tire road wheels, crawling traction trucks under one or both ends, or rail-road wheels of any gauge.
Attachments—Can be used with clamshell, orange-peel or dragline bucket; hook, skip, magnet or other standard fittings.
Capacity—¾ yard clamshell for handling loose material; ½ yard clamshell, orange-peel or dragline for excavating; 5 tons for hook work.
Standard Boom Length—30 feet for bucket work—can furnish up to 40 feet for derrick work.



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crops in considering that trees must recur; that once the initial supply is gone there must be another growing to take its place. And just as our people insist on building longer subways and riding not five miles to their work, but fifteen and twenty and thirty, to their own great discomfort, so if that tide be turned, I think you have already blazed a trail by beginning to turn the tide of the necessity of going hundreds of miles and even thousands of miles for the wood pulp that makes our paper, and for the forests that are turned into paper. You have begun the second growth which is going to save us from the necessity of building subways, so to speak, from New York and other places into the furthest reaches of Canada and the West, and even, unfortunately, into Europe.

"If that be an apt comparison, if it be just a modest thought put forward to you by way of an expression of pleasure, as one whose job it is to look at things from a public point of view, may I, if you please, add my word of congratulation, if it is well based, of very keen and deep and genuine appreciation of what I find to be the splendid combination of public spirit and private foresight that now obtains in the thoughts and acts of your wonderful Association."

Mr. Frederick C. Clark, on behalf of T. A. P. P. I., replied as follows:

"On behalf of the Technical Association I want to express our appreciation for your kind words of welcome. Your illustration of the crowd looking into the trenches at Forty-second street and the congestion around that particular district, perhaps, I think, accounts for the reason why every member of the Technical Association looks forward each year to this big annual meeting. It is the big event in our Technical Association life as it were. It gives us a chance to come together and meet each other to discuss questions of interest, and also, I think, to get into this wonderful city. I want again to express the appreciation of the Technical Association to you, Mr. Curran, for your very kind words of welcome."

President's Address

President Hatch then made his annual address, as follows:

"In reviewing the activities of our association for the fiscal year just ending, I shall leave the report of membership growth and finance to our secretary-treasurer and I shall confine myself to a review of scientific activities in general which bear an important relation to our industry.

"It is interesting to know that during the past year a Technical Association of the Pulp and Paper Industry of Great Britain has been formed, and a French association has been founded by the alumni of the paper making school at Grenoble. The formation of associations of this character indicate more clearly than ever the growing importance of putting manufacturing processes on a sound, scientific basis. The services of the technically trained man are more in demand today than ever, the readjustment through which business is going at the present time will result in much sharper competition, and only those organizations who realize the necessity of searching out the natural laws, which are the fundamentals upon which their processes are built, will survive. For several years business has come unsolicited and in great volume and, in many cases, it has not been considered necessary or there has not been enough time available to get at those fundamentals which make the greatest efficiency and economy. During the fever of war, economies in certain directions were practiced because of stern necessity and some lessons were taught at that time which might well have been remembered. The spirit of scientific investigation, however, received an impetus which has carried it forward in all lines of industry much faster than its normal rate of growth in pre-war times. This, I consider, is a fortunate condition, for the period through which we are now passing demands that every phase of manufacturing activity should be subjected to the closest scientific investigation and all wasteful and inefficient methods discarded.

"During the past year a cellulose section of the American Chemical Society has been formed. This section takes in the chemists of the different cellulose-using industries, and the activities of this section will, no doubt, contribute greatly to our knowledge of this complicated chemical product of nature upon which so many industries depend.

"During the year just passed, two volumes have appeared which deal in paper making. I refer to Witham's *Modern Paper Making* and Sutermeister's *Chemistry of Paper Making*. No text books on paper making subjects written by Americans have appeared for a number of years until the publication of the two volumes mentioned and it is gratifying to see Americans contributing to paper making literature again. Text books issued by the vocational education committee of our association and the Canadian association are now beginning to appear and in these volumes we will have a reference work on paper making of which the American Pulp and Paper Industry may well be proud, aside from their value as text books.

"The committee on vocational education is now formulating plans for carrying on its educational work in the various paper making communities and you will, no doubt, get the full details of these plans when you listen to the report of the committee.

"I am sure that all the members of our association will be greatly pleased with the recent action of Congress in which the appropriation of the Forest Products Laboratory has been increased by approximately one hundred thousand dollars. The work which the laboratory is doing is essentially a Governmental function, and the problems with which they deal are those greater problems which are either impossible or impracticable for individual manufacturers to attempt. Many of our members have devoted a great deal of time in their endeavor to secure adequate appropriations for the Forest Products Laboratory and I feel that this action of Congress fully justifies the efforts which they have put forth in behalf of the laboratory.

Bureau of Standards

"It is perhaps not generally known that the facilities of the paper section of the Bureau of Standards are at the disposal of manufacturing firms for the investigation of paper making problems. The section is well equipped with laboratories for chemical, microscopical and photo-microscopical research, and on the practical side there is a working pulp and paper mill with a rotary boiler, beating and washing engines, Jordan and Fourdrinier machine. If a paper manufacturer desires to test out the paper making possibilities of a certain material that has not hitherto been used, an arrangement can be made with the paper section of the Bureau of Standards for the pulping and conversion of the material into paper. All that is necessary on the part of the manufacturer is to supply the material and the operator. The conveniences of the laboratory will then be placed at his disposal, provision being made for the use of the machinery. The only other requirements on the part of the Bureau of Standards is that a report on the experiments be prepared for the use of the Bureau.

"Our members will all have an opportunity to see the equipment of the Bureau of Standards at the proposed meeting which is to be held at Washington this fall. This meeting is to be held in conjunction with the Superintendents' Association, and I consider that it will be a splendid opportunity not only to see the wonderfully complete equipment of the Bureau of Standards, but also the two associations which are most intimately connected with the manufacture of pulp and paper will be able to get together and get acquainted. The superintendents and technical men have a great deal in common and I am sure that both associations will welcome this opportunity to get together. I only hope that it will be a basis for many future joint meetings in which science and practice will mingle to their benefit.

"When our association was first formed our membership was limited to a few who were working along very similar lines and who kept in close personal touch. With the growth of the association, that condition has gradually changed until now we have lost that personal touch in a large organization with many diverse interests.

"It has been suggested by some of our members that the association should be sectionalized, and by that term I mean that membership should be divided into groups which have common interests. Attempts have been made in the past to sectionalize our meetings so that those members having common interests could get together and discuss those problems which virtually affect them. These meetings have always proved to be very popular, and the interest which has been taken in them leads me to believe that the work of our association could be carried on with a higher degree of efficiency if a plan of sectionalizing can be successfully worked out. In working out such a plan, however, care must be taken that the association, as such, does not lose its individuality, and as a result of it lose the bond between the sections of the association as a whole. Sectionalizing can be carried too far and result in just as much inefficiency and loss to its membership as would an attempt to hold the association together with no regard to the individual tastes of its membership. While I believe in the idea of a very carefully laid out plan so that the association and membership as a whole will not suffer as a result of too thorough division.

"Another question which has occupied the attention of the association in the past, and which I should like to place before you again at this time, is the question of a committee on machinery and apparatus. This subject has been brought up and discussed at different times during our existence but

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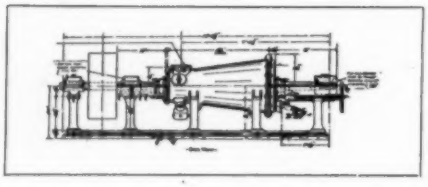

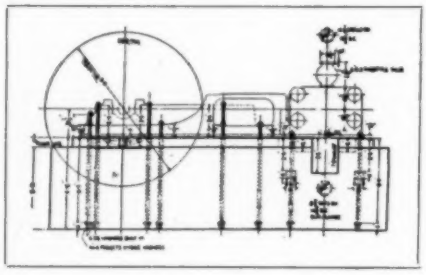

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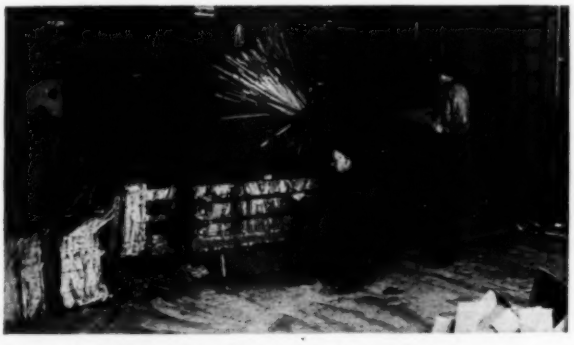

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nothing very definite has ever been accomplished. I think it would be a valuable service for our members if we had a committee who would gather data regarding machinery and apparatus from members who have had experience and be in a position to furnish members making inquiry with an impartial report as to the value of such machinery or apparatus.

"At a meeting of the executive committee held in Saratoga in September, 1920, it was decided that the association would not publish a journal at the present time, but that a volume containing transactions and special papers would appear three or four times a year. You have seen the latest volume, and the future of its publication is in your hands. It is open to original papers by our membership and is well fitted for placing scientific discussions on matters pertaining to the pulp and paper industry before those who are most interested. The program of the present series of meetings is before you, and I sincerely hope that you will all return to your respective organizations much benefited by your contact with other workers in the same field.

"I would especially call your attention to the general meeting of the American Paper and Pulp Association, which is to be held Thursday morning, April 14, and to which the Technical Association is invited. I trust that our membership will be represented by a large attendance.

"In conclusion, I wish to thank the various committees for the support which they have given me during the past year, and I trust that they will carry on the work which has been started, and the work which will come up, with pleasure and profit to themselves and the association."

Secretary-Treasurer Thomas J. Keenan prefaced his annual report with the statement that the work of his office was covered to some extent in the president's address and in the report of the executive committee and the auditing committee. He gave a summary of income and expenditures covering the fiscal year, February 1, 1920, to January 31, 1921.

The total cash receipts from contributions to the Vocational Education Fund amounted to $11,967.68, which, with a balance on hand, February 1, 1920, of $726.42, made a total for the year of $12,694.10. Disbursements on vouchers of the committee, left a balance on January 31, 1921, of $1,109.23 to the credit of the Joint Vocational Education Committee

Cash receipts of the Technical Association from all sources including cash on deposit, February 1, 1920, amounted to $16,361.96, with total disbursements of $11,217.74, leaving a balance on hand to the credit of T. A. P. P. I. January 1, 1921, of $5,144.22. Add to this the balance of the Vocational Education Fund of $1,109.23 and petty cash fund of $40 and there remains a total cash on hand and on deposit of $6,253.45.

Mr. Keenan announced that a loss in membership caused by the recent advance in membership dues, had been offset to a great extent by admissions during the year.

The report of the Executive Committee follows:

Report of Executive Committee

During the interval since the executive committee reported at the fall meeting in Saratoga, September 1, 1920, the activities of the association have continued unabated. The joint committee on Vocational Education and the Committee on Bibliography have issued through the trade press a number of valuable contributions to the literature of the industry, and these will be the subject of comment and review in their respective reports. In addition, there has been sent out from the secretary's office, at regular intervals, full and informing accounts of the association's current activities.

Far-reaching plans for the extension of the work of the association are under consideration. These extension plans will render more direct service to our members. The plans are rapidly developing and will be brought to the attention of our members before the next meeting. The advance in dues adopted by the association at the fall convention in Saratoga Springs, has resulted in a slight loss of membership, which has, however, been offset to some extent by admissions. A membership of 602 was reported at the fall meeting, our roll of members today number 577, showing a net loss of twenty-five. Your executive committee hopes that members will be prompt in their payment of dues. It does not appear to be well understood that according to section 14 of article III of the constitution, a member who fails to pay his dues at the end of the year is automatically suspended.

Among the publications issued by the association since the fall convention, are: Report on Paper Testing by the chairman of the Paper Testing Committee, and Series III of *Technical Association Papers*. A number of separate publications of committees have been published in the journals of the industry. *Technical Association Papers*, Series IV, is now in preparation, and will be issued speedily after the close of the present meeting.

It is recognized that the decision of the association to drop for the present, the publication of a monthly journal, has resulted in an enforced change of plans looking to an increase of service to our members. It became necessary to develop new plans somewhat along the following lines: The formation of groups interested in specific subjects in order that the association as a whole may know individuals and firms interested in particular problems, is part of our plan. It is also proposed to start a systematic collection of technical data to be available to our members under certain prescribed conditions. There are a number of other phases of this plan which will be presented as a whole to the association for consideration and comment. The present condition in the industrial world demands the most active efforts of the association, and its success will depend not entirely on the executive committee, but mainly upon the wholehearted support of the individual association members.

It must be plain to all of us that there is much latent or unused talent among the members of our organization. It is to be our endeavor to bring this to the surface and make use of it to the advancement of the industry, in the same way as has been exemplified in the remarkable compilations presented by the committee on Bibliography under the respective chairmanships of the lamented Henry E. Surface, and our present active chairman, Clarence J. West.

Your committee has met at intervals since the fall meeting for the transaction of business pertaining to the association, election of members, arrangements for conduct of secretary's office, annual meeting, etc. Much of this is covered in the president's address and secretary's report.

Respectfully submitted,
Robert B. Wolf.
Robert S. Hatch, Chairman.
Grellet N. Collins.
Frederick C. Clark.
Henry P. Carruth.
George E. Williamson.
Robert S. Kellogg.

Election of Officers

At the annual election of officers during the afternoon session on Wednesday, George E. Williamson, chief engineer of the Strathmore Paper Company, Mittineague, Mass., was elected president of the Technical Association of the Pulp and Paper Industry for the ensuing year. Mr. Williamson succeeds Raymond S. Hatch, who has served two terms as president.

Frederick C. Clark, head of the department of technical control of the American Writing Paper Company, Holyoke, Mass., was elected vice-president, and Thomas J. Keenan, of New York, was again chosen secretary-treasurer.

The following were elected to serve on the executive committee for three years: Grellet N. Collins, of Dill & Collins, Philadelphia; George H. Harvey, of The Colin Gardner Paper Company, Middletown, O.; E. C. Tucker, of the Crocker-McElwain Paper Company, Holyoke, Mass., and George K. Spence, of the New York & Pennsylvania Company, Lock Haven, Pa. The executive committee of the association is now composed of the above four gentlemen together with President Williamson, Vice-President Clark and Robert S. Kellogg.

Committee Reports

The Tuesday afternoon session was taken up by the reading of reports by standing committees.

The following reports were also submitted, some of which appear elsewhere in this issue of the Paper Industry:

Auditing Committee—E. C. Tucker, Chairman.
Beater Furnish—J. C. Sanburn, Chairman.
Coated and Processed Papers—Clarke Marion, Chairman.
Dyestuffs Committee—Ross Campbell, Chairman.
Groundwood—William A. Munro, Chairman.
Heat, Light and Power—Howard S. Taylor, Chairman.
Joint Committee on Methods of Testing Moisture in Pulp—E. C. Tucker, Chairman.
Paper Testing—Frederick C. Clarke, Chairman.
Soda Pulp—George K. Spence, chairman.
Standard Methods of Testing Materials—E. C. Tucker, chairman.
Sulphate Pulp—Carl Moe, chairman.
Sulphite Pulp—W. E. Byron Baker, chairman.

Abstracts of Literature

The following report of the Abstract Committee was read by Ross Campbell, chairman.

The most important feature of the abstract work during

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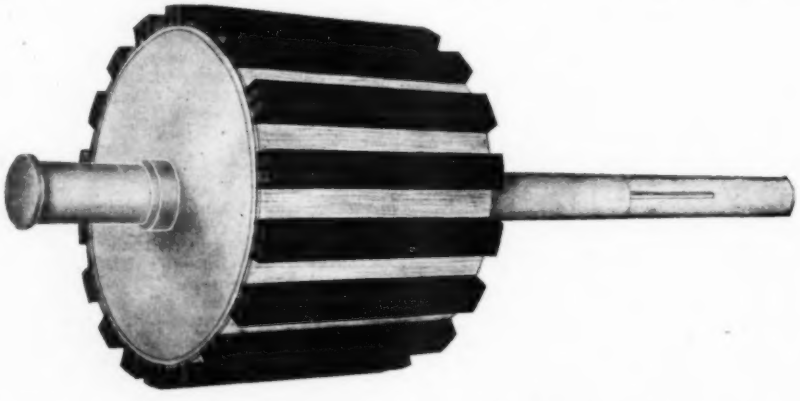

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the past year has been the decision to furnish all abstracts to the secretary. They are to be distributed by him to such magazines as may desire to avail themselves of this service. In addition they are to be published complete in *Technical Association Papers;* thus each member will have available for reference, a complete set of abstracts thoroughly indexed covering paper and allied industries.

During the year a total of 1,084 inches of abstract material has been submitted by the combined American and Canadian committees. A list of the journals now being covered by these committees is given below.

Any suggestions as to additional journals which should be covered will be appreciated.

Journals Abstracted

CANADIAN SECTION
- Forestry Journals—Clyde Leavitt.
  - Canada Lumberman and Woodworker.
  - Western Lumberman.
  - Pacific Coast Lumberman.
  - Canadian Forestry Journal.
  - American Lumberman.
  - American Forestry.
  - Journal of Forestry.
  - Paper Trade Journal
  - Timberman
  - International Review of Science and Practice of Agriculture.
  - North Woods.
  - Conservation.
  - Conservationist.
- English Journals—Miss Collins.
  - World's Paper Trade Review.
  - Papermaker & British Paper Trade Journal.
  - Papermaking.
  - Papermakers' Monthly Journal.
  - China Clay Trade Review.
  - Paper Container.
  - A Papineau Couture.
  - Le Papier.
  - La Papeterie.
  - La Revue Universelle de La Papeterie.
  - Bulletin du Syndicat des Fabricants de Papier et Carton de France.
  - Chimie & Industrie.
  - Canadian Chemical Journal.
  - Journal of Industrial & Engineering Chemistry.
  - Journal of the American Chemical Society.
  - Journal of the Society of Chemical Industry.
  - Paper.
  - French Patents.
  - Canadian Patent Office Record.
  - Pulp & Paper Magazine of Canada.
  - Chemical & Metallurgical Engineering.
- T. A. P. P. I.—C. J. West.
  - Paper Trade Journal.
  - Paper Mill.
  - United States Paper Maker.
  - Fibre Containers.
  - The Paper Maker.
  - Paper Industry.
  - German Patents.
  - Chemical Abstracts (only such articles as are not listed under "Pulp & Paper" and yet may be of interest to the trade.
  - Papierfabrikant.
  - Papier-Zeitung.
  - Wochenblatt für Papierfabrikation.
  - United States Patents.
  - Journal of the Royal Society of Arts.
  - Consular Reports.
  - Proceedings of the American Society for Testing Materials.
  - English Patents.

Bibliography

The following report of the Committee on Bibliography was read by Clarence Jay West, Chairman.

The Technical Association of the Pulp and Paper Industry is probably unique in that, among its standing committees, it has a committee on Bibliography. This was the result of plans made by the committee on publications, who stated in their report for 1916 that

> "It is also planned to prepare a bibliography of the publications on pulp and paper."

Shortly after, this committee was divided into a committee on abstracts and a committee on bibliography. Henry E. Surface, of the Forestry Division, Department of Agriculture, was appointed chairman of the latter, which position he held until his unfortunate death in the summer of 1920. Mr. Surface was peculiarly fitted for this work, because he was prominently connected with the work on papermaking conducted by the Bureau of Plant Industry and the Forestry Bureau, and also because he had done considerable bibliographic work for the government.

The work of the committee is entirely dependent upon the co-operation of the members of the association and of librarians and bibliographers who realize the value of such work. Mr. Surface associated with him Dard Hunter, of Chillicothe, Ohio, who is an expert on hand-made papers, and later Robert W. Sindall, the well-known English paper technologist. The success of the work is evidenced by the appended list of contributions. The several bibliographies so far published will be found to aggregate about 245 solid pages (8x12, double column), divided according to years as follows: 1916, 5; 1917, 13; 1918, 6; 1919, 47; 1920, 110; 1921 (to March 24), 64. These have appeared in *Paper* (Contributions 1-15) and the *Paper Trade Journal* (16-25). It was, and still is the hope of the committee finally to compile a general bibliography of the Pulp and Paper Industry, which will be conveniently arranged for the use not only of the Technical Association, but also of the general technical public.

It will be noted that the appendix (list of contributions) shows that the committee's publications have developed three phases: First, "book" literature; second, research contributions by various paper research institutions and organizations; and third, reading lists or references ("book" and "analytical") on special subjects within the pulp and paper field. Despite the number of contributions, there is comparatively little duplication; among the "book" titles, such as there is, has been purposely made to correct errors or augment descriptive data in earlier published lists. In spite of the work already published, the field of "books" alone has not been adequately covered by the committee's contributions because library studies continue to develop new titles, even without exhaustive search.

The present work of the committee is directed largely along the lines of the third phase, that is, reading lists on special subjects. It is felt that the special lists are of greater value at present than further compilations of lists of books, in view of the fact that this phase of the work has been fairly well covered by the earlier contributions of the committee. The following lists are in course of preparation:

A Reading List on Sulphate Kraft Pulp, by Clinton K. Taylor.
Marbelled Papers, by Dard Hunter.
Dyeing of Paper Pulp.
Drying of Paper.
Special Paper—Cigarette Papers.
Analytical Procedures.
Paper Textiles.

Papermaking Library

During the past year, the following notice was issued from the secretary's office:

To Members of the T. A. P. P. I.:

All of us, from time to time, notice titles of books, pamphlets or catalogs which we feel would be very interesting reading, and which might contain the answer to one of our problems. If we knew that we could write to one person, and either secure the publication, or information as to where it might be purchased or borrowed, we would feel more inclined to follow up these leads. The committee on bibliography proposes, therefore, to attempt such a service for the members of the Technical Association. Our idea is to build up, as rapidly as possible, a library of papermaking, which would be available, through loans, for a limited period of time, to the industry.

Our beginning must necessarily be small, as books are very expensive. As the association grows in numbers, we hope that the executive committee will be able to appropriate a definite amount each year to the building up of such a library. Meantime, we must depend upon the generous co-operation of our friends in the industry. We have had such co-operation on the part of a number of manufacturing organizations, who have sent us their advertising literature which is much more than mere advertising.

This first letter is addressed particularly to those who are in a position to send us advertising literature, pamphlets, reprints and books bearing upon the pulp and paper industry. From time to time lists of accessions will be published, and distributed to the members of the association. In this way they will be kept in touch with the recent developments.

May we ask the hearty co-operation of all those interested in the industry? Please send us your publications, and also

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names of books, pamphlets, catalogs, etc., which you feel properly belong in such a collection. These will be secured as far as possible and made available to all. It is obvious that success in such undertaking can come only through the assistance of the entire industry.

Clarence J. West, 30 Charles River road, Cambridge, Mass. (The present address of the chairman is: National Research Council, 1701 Moss avenue, Washington, D. C.)

Response to this note was not very general, which, while not surprising, is to be regretted. It is impossible to keep in touch with all the books and pamphlets, and advertising literature being issued, and it would be comparatively simple for every friend to add the chairman's name to their mailing lists. The committee would then be in a position to keep all the association informed of new materials. Please help us in this way.

Manual of Papermaking Terms

During the past year, Mr. Hunter, member of the committee called the attention of your chairman to the desirability of a manual of papermaking terms.

Shortly after this letter, a note was found in the World's Paper Trade Review to the following effect:

Suggestions are being made that a dictionary or manual of terms used in the paper and pulp industry should be compiled. Dr. H. P. Baker, a new secretary of the American Paper and Pulp Association, has mentioned the need of such a work in America, and Professor Schwalbe, Germany's leading pulp and paper expert, has written a book on terminology in the paper and pulp industry, this book being endorsed by the trade associations of Germany. It has been suggested that such a terminology should exist in all the principal languages spoken in papermaking countries. A combination of them would be a valuable technical dictionary facilitating international intercourse among the scientists as well as the practical papermaking experts of the world.

The matter was then taken up with Secretary Baker, who wrote that he felt that the proposition was one which could best be handled by the Technical Association, but that he personally, and as secretary of the American Paper and Pulp Association would be willing to co-operate in any way possible. This is a work which, to be successful, must have the hearty support of every member of the association. As soon as work is sufficiently under way to permit, a prospectus of the book should be published, and criticism and suggestions invited. The work will be under the immediate direction of Dard Hunter, of Chillicothe, Ohio, to whom all correspondence should be addressed.

The committee desires again to express its appreciation for the co-operation which has been given to date, and earnestly requests those interested in this line of endeavor to assist the work of the committee until such time as the Technical Association can furnish proper financial assistance. An appendix listing 25 contributions supplemented this report.

Vocational Education

The following report of Committee on Vocational Education was read by George E. Williamson, Chairman.

Work on the preparation and publication of the textbooks and pamphlets on "The Manufacture of Pulp and Paper" has been continued without interruption since the last annual meeting of our association. You have received progress reports from time to time through the trade press and in particular at the fall meeting of the association in Saratoga Springs last September.

It is with a feeling of gratification that the committee is able to report the completion of volumes I and II of the textbooks. Volume I was first exhibited at the annual meeting of the Technical Section of the Canadian Pulp and Paper Association in January. It is expected that volume II will be presented for the first time here today.

The preparation of the subject matter for these books has been a task so much greater in magnitude than was even anticipated, that it is doubtful if any of your committee would have had the audacity to recommend that funds be raised and the course in pulp and papermaking developed had they known what was before them. Nevertheless, the results of the work have already borne fruit, and we are confident of ultimate success, even greater than was first thought possible.

But it is only through the untiring and indefatigable efforts of our editor-in-chief, Mr. J. N. Stephenson, and those who have assisted him in his work, that the results so far obtained have been made possible. The arduous work done by Mr. Stephenson and his assistants will, undoubtedly, constitute one of the finest examples of unselfish and devoted service which has ever been rendered the pulp and paper industry on this continent.

Report from Mr. Stephenson

To give you an intimate picture of the progress of the work done and the conditions in which we find things at the present time, I quote from a report recently received from Mr. Stephenson:

"Volume I contains four sections entitled Arithmetic, Elementary Applied Mathematics, How to Read Drawings, and Elements of Physics. Each of these sections is numbered independently from first to last, so that each really forms a textbook of the subject treated. The index is unusually complete and any reference can be located very quickly as each page bears both the number of the section and the number of the page. The editor has already received a number of very complimentary references to the excellence of this first volume and the committee may be assured that the book will meet with general approval and fulfill its purpose. The price of volume I is $5 per copy in United States funds. Plans of advertising and distributing volumes I and II, and the others as they appear, will doubtless be completed at the April meeting.

"All the type has been set for volume II and zinc cuts prepared for the illustrations. This volume will include Mechanics and Hydraulics, Elements of Electricity, and Elements of Chemistry. These sections are numbered 1, 2 and 3 respectively, and the pages are numbered independently from 1 to the end of each section.. The last galley proofs are now in the mail and the page proofs for sections 1 and 2 have been returned to the printer. Page proofs for section 3 should begin to come through in a few days and will no doubt all be approved and returned to the publisher before the end of the month so as to insure the publication of the second volume on time.

"With regard to volume III, we have been requested by the publisher to hold the manuscript until at least 75 percent of it is completed. There are nine sections: (1) Kinds and Properties of Pulpwoods; (2) Preparation of Wood; (3) Manufacture of Mechanical Pulp; (4) Manufacture of Sulphite Pulp; (5) Manufacture of Soda Pulp; (6) Manufacture of Sulphate Pulp; (7) Treatment of Pulp; (8) Refining of Pulp; (9) Analysis of Pulp and Raw Materials. The sections on 'Treatment of Pulp' and 'Testing of Materials' may be said to be ready for the printer. The section on 'Sulphate Pulp' is receiving the final touches. The original draft of the sections on 'Soda Pulp' and 'Bleaching' are now being checked up finally by the editor after having been reviewed and criticized by a number of practical experts. The second on 'Groundwood' is just about completed by the author and more than half of it has been sent to the editor. The section on 'Wood Preparation' will be delivered within a week, some of it having already been published and requiring only to be reedited. The section on 'Sulphite' is due in three weeks and the section on 'Refining' should come along shortly after. That material will keep the editor at home nights for some time. The committee has reason to hope that volume III will be ready at the fall meeting.

"Volume IV takes up the manufacture of paper and draft of all but one section has been received by the editor. Several of these are still out for criticism by others in the industry and this method of reviewing the work has proved exceptionally helpful in insuring that the books will represent the very highest standard of information and treatment of the special matter. The thanks of the committee are heartily extended to those who have given such valuable service in the reading of these manuscripts.

"Volume IV will contain the following sections: (1) Character and Preparation of Rag and other Fibres; (2) Treatment of Old Papers; (3) Beating; (4) Sizing; (5) Loading; (6) Coloring; (7) Paper Machines.

"It is expected that volume IV will be completed at the end of the year and certainly by the next annual meeting of the Canadian Association and that volume V will be ready for the next annual meeting of the Technical Association.

"Volume V will continue the Manufacture of Paper. Several sections are already in hand and one, namely that of Handmade Papers, is in type. Other subjects to be treated in this volume are Tub Sizing, Finishing Operations, Coated and other Treated Papers, A Dictionary of Papers, possibly with a glossary of pulp and paper mill terms, and a section on General Equipment. The part of this section dealing with Pumps is practically completed and the section on Electrical Equipment is well under way. There will be an appendix for tables, formulas, etc., and members of the association are invited to submit any handy information that would likely prove of value in such a place.

"The editor wishes to thank the many friends of the industry who have given generously of their time in assisting in the work and to state that the relations of the committee with the publishers, the McGraw-Hill Book Company, of New

WELDED STEEL DIGESTERS

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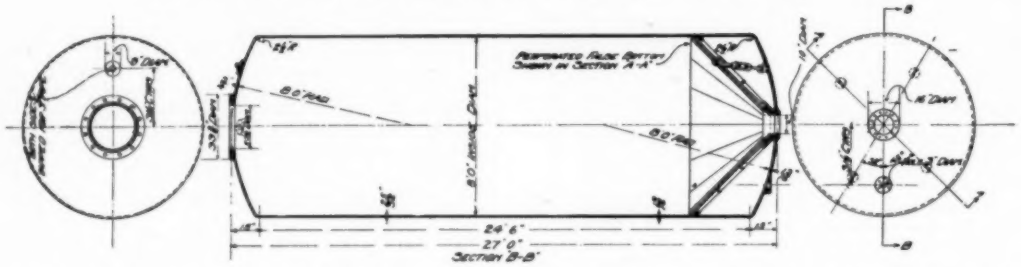

40 welded steel digesters, made by Continental Iron Works, capacity 1500 cu. feet, each 8′ 0″ inside diameter, length over all 27′ 0″, shell made of 13/16″ tank steel at bottom and tapered to 25/32″ at top. Bottom of digester made of 13/16″ steel, fitted with boss tapped for 3″ pipe connections and one 10″ diameter outlet. Top of each digester is made of ¾″ steel and fitted with a 23½″ diameter manhole and steel cover with hinge bolts. Also fitted with boss tapped both sides for 3″ pipe connections.

Each digester was designed to stand a working pressure of 110 pounds per square inch and tested to stand a pressure of 165 pounds per square inch.

Each digester is furnished with a cast iron supporting ring and cast iron false bottom, hoppers, guides, etc., ready for operation.

Complete industrial plants and plant sites at low prices. Write our Industrial Department. Machinery and chemical equipment of all kinds now available.

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ARE YOU FAMILIAR WITH GYPSUM ROOFS?

Highly Insulating

Elimination of Condensation
Economy in Fuel
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Typical Machine Room with Monolithic Gypsum Roof

Permanent

30 Years in Service
No Repair Expense
MONOLITHIC, Cast in Place Type

Light Weight

Economy in Steel Framing
No Heavier than Wood

These qualities are most desirable in Pulp and Paper Mill Roofs and are now realized by scores of mills throughout the industry which have had **Monolithic Gypsum Roofs** in service for many years.

We are Specialists in this Construction and Erect Complete. ***May We Not Serve YOU?***

LATHROP-HOGE CONSTRUCTION CO. Union Central Building Cincinnati, O.

CHICAGO, 601 Tacoma Building **CLEVELAND, 516 Union Building**

York, have been very happy indeed and the preparation of the work, which is an exceptionally large and complicated affair, is going along very smoothly.

"The committee has engaged a draftsman to work under the immediate direction of the editor in the preparation of the pencil drawings for our illustrations, while the Scranton force has been reduced to the associate editor and two draftsmen who do any necessary tracing and put on the final touches to make the drawings most satisfactory for producing illustrations for the books. The many complimentary references to these illustrations indicate that the trouble and expense put by the committee on this phase of the work are fully warranted.

"Respectfully submitted,
"J. N. STEPHENSON."

Our committee wishes to urge upon the members of the Technical Association who are contributing to the subject matter for the textbooks and are reviewing manuscripts that this work be not delayed. It will be physically impossible for our editorial staff to complete its task within the time estimated by the editor if we as individuals do not attend to these matters with promptness. Most of us are, undoubtedly, busy men in spite of the present conditions of business, and it is very easy to put off from day to day work of this kind. It is only fair to Mr. Stephenson, however, to eliminate delays in any part of the work we may be called upon to do.

A financial report will be submitted by the secretary of our committee, Mr. R. S. Kellogg. Owing to the fact that the task which this committee set out to do is far greater than anticipated, and that the time required will be longer than originally thought necessary, the question of funds becomes of importance. Thus far, we have been able to make our collections without difficulty and pay our bills promptly, but we are now nearing the "bottom of the barrel," and must, undoubtedly, obtain more money to complete the job. The Technical Section of the Canadian Pulp and Paper Association has appropriated $5,000 in addition to the $10,000 originally granted, and it is, undoubtedly, up to us to do our share. Unfortunately, it is more difficult for us to raise funds, inasmuch as we must depend on individual subscriptions.

However, from the report of progress made, from a careful examination of the volumes already published, and from a knowledge of all that has been accomplished and is now under way, we believe there will be little difficulty in obtaining the small amount of additional money necessary to bring the task to a successful conclusion.

The remainder of the Technical Association meeting was devoted to the reading of specially prepared articles by various members, most of which will be found verbatim elsewhere in this issue of THE PAPER INDUSTRY.

Annual Banquet

The annual banquet of the Technical Association was given in the Hotel Astor on Tuesday evening, with about 250 members and guests present, this number representing almost a hundred more than attended last year's dinner. Judge Charles F. Moore presided as toastmaster, and the speakers and guests of honor were as follows:

Prof. Marston T. Bogert, LL.D., Columbia University—Past President of Society of Chemical Industry, New York.
Philip T. Dodge—President, International Paper Co., New York.
George Chahoon, Jr.—President, Laurentide Company, Ltd., Grand'Mere, P. Q.
Ellwood Hendrick—President, The Chemists' Club, New York.
Robert B. Wolf—Vice-President of T. A. P. P. I., and the American Society of Mechanical Engineers, New York.
Calvin W. Rice—Secretary, American Society of Mechanical Engineers, New York.
Calvert Townley—Assistant to President, Westinghouse Electric & Manufacturing Company, New York.
Leslie R. Palmer—President, Lockwood Trade Journal Company, New York.
George Carruthers—Chairman, Technical Section, Canadian Pulp and Paper Association, Toronto.
Carlile P. Winslow—Director of the Forest Products Laboratory, Madison, Wis.
D. Clark Everest—Secretary and General Manager, Marathon Paper Mills Company, Rothschild, Wis.
Freas B. Snyder—President, W. C. Hamilton & Sons, Inc., Philadelphia.
R. S. Kellogg—Secretary, News Print Service Bureau.
Joseph B. Seaman—Vice-President, Seaman Paper Co., New York.
John C. Schmidt—President, Schmidt & Ault Paper Co., York, Pa.
Arthur L. Dawe—Secretary, Canadian Pulp & Paper Association, Montreal.
J. Newell Stephenson—Editor, Vocational Education Textbooks.
Robert Willis—New York.

Professor Bogert spoke on the subject of "Chemical Disarmament." He cited how practically every chemical used in modern chemical warfare had its humanitarian and peacetime uses in relieving the sufferings of peoples, and urged that every effort be made by members of the Technical Association to induce Congress to aid the chemical industry of the country.

Mr. Hendrick gave an amusing talk on the subject of "Smell," and pointed out how little this one of the five senses of man is understood. He also introduced several witty stories into his speech which were received with much laughter.

Mr. Willis, a well known humorist, told a series of war yarns which kept his audience in a constant uproar of laughter.

Mr. Dodge made a very brief talk in which he praised the good work being done by paper trade associations, notably the Technical Association.

Cost Association Luncheon

A luncheon and meeting of the Cost Association of the Paper Industry was held at one o'clock P. M. on Wednesday, April 13th, at the Waldorf-Astoria Hotel.

President Seth L. Bush, Manager of Research of Crocker-McElwain Co., Holyoke, Mass., presided.

Four excellent addresses were made as follows:

"Budget Controls," by Durward E. Burchell, Professor of Industrial Accounting, Harvard University; "The Importance of a Cost System from a Banker's Viewpoint," by Ellery A. Baker, Assistant Vice-President of the National City Bank of New York; "Some Practical Aspects of Installing Cost Systems," by C. Oliver Wellington, Member of the Firm of Scovell, Wellington & Co., New York City; "Preparation of Cost Figures for Administrative Control," by Harold Dudley Greeley, C. P. A. of New York.

Some of the above addresses are published in this magazine and others will be published later.

Annual Meeting of Salesmen's Association

The Annual Meeting of the Salesmen's Association of the Paper Industry was held on Tuesday, April 12, 1921, at the Waldorf-Astoria Hotel, New York City.

The usual snappy program which always characterizes these meetings was again the order of the day, under the able guidance of their dynamic president, George K. Gibson, who in his address said that in twelve months the paper industry has gone from the most tremendous output and demand for tonnage ever known in the history of any industry to where they are running barely fifty percent of the demand for the tonnage. He said that the salesmen who had some real sales work to perform 1918 and the beginning of 1919 found by the end of that year he was unconsciously or consciously transferred from the sales department and given the office of a "traffic cop." He said that now, however, the salesmen is the man who is looked to. There never were such opportunities as exist at present. "In looking over the situation and studying it back and forth," he said, "it is not the fellow with the sharpest pencil, nor the fellow that can buy more wood than somebody else, nor the fellow that can get coal; there is no relief from this situation except the relief that comes from the contact of a man of faith and courage and personality, looking up and going out and putting back confidence into the trade."

The morning's program consisted of routine business, an address by their chaplain, Rev. George Craig Stewart, D. D., and the election of officers.

Mr. H. H. Reynolds, Sales Manager of the B. D. Rising Paper Co., Housatonic, Mass., was elected president for the ensuing year. Dr. Hugh P. Baker was re-elected Secretary-Treasurer. Dr. Baker, who wanted to decline owing to the stress of other duties, was urged upon to accept it and was granted permission to obtain an assistant who might by next year be able to assume the work of secretaryship if the Association so desired.

Four Vice-Presidents were then elected to carry out the idea of having an executive in each of the four strategic centers. It was expressed that these vice-presidents should be the real operative force of the Executive Committee who would be expected to call frequent sectional meetings, possibly four a year.

The following were elected:

FLOWER CITY TISSUE MILLS COMPANY

Rochester, New York

Manufacturers of

High Grade Fourdrinier Tissues

including

No. 1 White Wrapping Tissue, Bleached and Semi-bleached, Tissues for Waxing and specialties.

Mill at Rochester, N. Y.

SCOTTSVILLE PAPER BOX BOARD CORPORATION

Rochester, New York

Manufacturers of

High Grade Folding Box Board, Manilla Tag and Letter File Folder Stock, News Middles, Lined Boards, and Specialties

Mill at Scottsville, N. Y.

WE control our operations from "TREE TO TRADE" with the purpose of making BETTER Envelope and Printing MANILAS

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New York Sales Office
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New York City

Western Sales Office
507 Union Trust Building
Cincinnati, Ohio

Arthur E. Ford, Chemical Paper Mfg. Co., of Holyoke, Mass., Vice-President of New England District; J. L. Fearing, Chicago office of International Paper Co., Vice-President of Chicago District; R. T. Houk, Jr., The G. H. Mead Co., Dayton, O., Vice-President of Miami Valley District; L. B. Steward, Vice-President of New York District.

The afternoon meeting was given over to hearing two excellent addresses.

Mr. Charles Coolidge Parlin, Manager of the Commercial Research Department of the Curtis Publishing Company, presented an up-to-date digest of the commercial and industrial situation of today, and illustrated his talk with a number of charts.

Mr. Harrington Emerson, renowned engineer, and an outstanding and unequivocal authority on the labor situation, spoke on the subject of labor.

A banquet dinner was held in the evening at which the ladies were invited. Dr. Frank Crane gave his inimitable address on "The Ten Commandments of Salesmanship" followed by a short talk by Dr. Stewart, Chaplain.

The balance of the evening was given to dancing.

Annual Meeting of the National Paper Trade Association

The annual meeting of the National Paper Trade Association was held on Wednesday, April 13, 1921, at the Waldorf-Astoria Hotel, New York.

President Ross P. Andrews, presiding, said that the business of the paper merchant of the United States has passed the period where business was carried on by guesses and hunches. Successful business men of today are the ones whose directions depend upon figures and facts. Attention was called to the Statistical Bureau which is considered to be one of the most important parts of the organization.

He said in words of admonition to the rank and file that there have been too many members who expect the National Association to do everything for them. The reward that a man gets from such an association is measured by what he has done, and is expressed by the Rotorians' motto: "He Profits Most Who Serves Best."

The report of Secretary Ridgeway was a complete resume of the eventful history in paper merchandising of the last year.

"Prices undoubtedly went too high," he said, "but, if the industry keeps its head, there is no reason why the reaction should carry prices too low, yet there is grave danger of this happening, if pessimism takes too strong a hold on the industry. According to our way of thinking, the industry should bend its energy to eliminating any unreasonable profits in whatever branch of the industry they may exist and all unnecessary expense in order that prices may be lowered to rock bottom. We would regret to see this done too rapidly but we believe every effort to retard a reasonably speedy complete readjustment will only add to the period of depression."

Officers elected for the following year are as follows:

President, Mr. E. F. Herrlinger of Cincinnati; vice-president in charge of Fine Paper Division, Mr. Charles N. Bicknell, Cincinnati; vice-president in charge of Coarse Paper Division, Mr. Frank W. Power, Boston; treasurer, Mr. A. J. Corning, Baltimore.

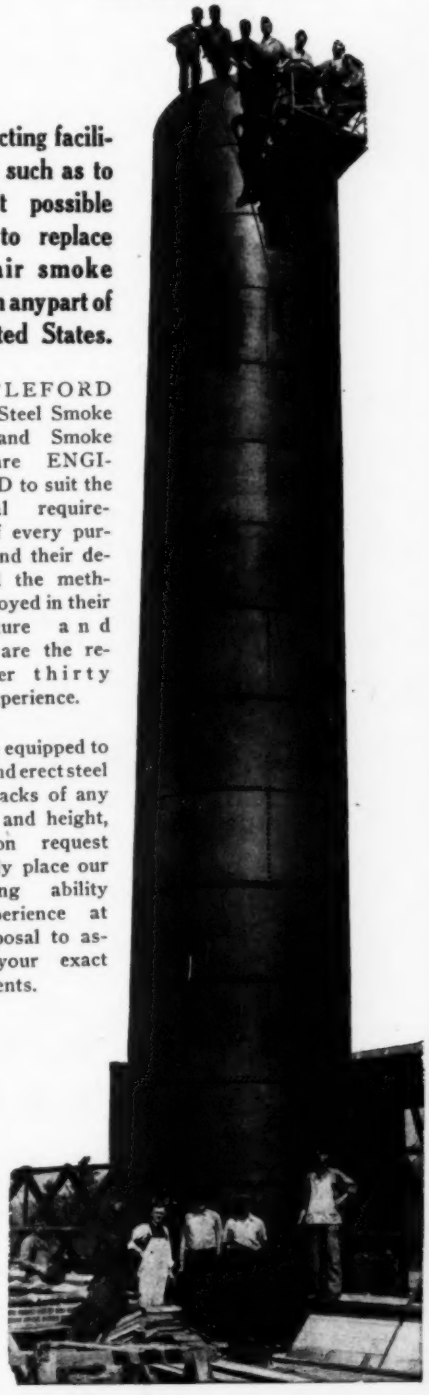
News Miscellany

March Meeting of Michigan Superintendents

About twenty-five attended the regular monthly meeting of the Michigan Division of the Superintendents' Association, which was held at the Park American Hotel, Kalamazoo, on Thursday evening, March 24. The usual dinner was served at 6:45 P. M. after which an address was delivered by Mr. W. W. Cronkhite, of the General Electric Co., on "Sectional Motor Drives and Their Application to Paper Machines." Mr. Charles C. Hall, Vice-Pres. and Sales Manager of the New Era Manufacturing Co. also gave an address on "Metallic Packings."

Mr. Cronkhite went into his subject very thoroughly and illustrated it with a number of stereopticon slides. He also exhibited a blue-print of the new paper machine recently in-

SMOKE STACKS
BREECHINGS
TANKS



Our erecting facilities are such as to make it possible for us to replace or repair smoke stacks in any part of the United States.

LITTLEFORD BROS. Steel Smoke Stacks and Smoke Flues are ENGINEERED to suit the individual requirements of every purchaser, and their design and the methods employed in their manufacture and erection are the results over thirty years' experience.

We are equipped to furnish and erect steel smoke stacks of any diameter and height, and upon request will gladly place our engineering ability and experience at your disposal to ascertain your exact requirements.

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500 East Pearl Street Cincinnati, Ohio

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Manufacturers of

Paper

MILLS AT

Norfolk, N. Y. Raymondsville, N. Y.

Norwood, N. Y.

"Direct Mill Service to the Paper Merchant"

BERTCHILL PAPERS · BHC · HIGHEST POSSIBLE QUALITY

PAPER and BOARDS

OF EVERY DESCRIPTION

Quality, Price and Service are the three essentials of a satisfactory source of supply.

WRITE US FOR SAMPLES AND QUOTATIONS

Berton C. Hill Company

INCORPORATED

Exclusive Mills Sales Agents

501 Fifth Avenue at Forty-Second St., New York City

stalled at the Crown Willamette Paper Co., West Linn, Oregon, having a sectionalized electric drive, and on which, it is said, newsprint is being made steadily at over 900 feet per minute. Many interesting points were brought out in the discussion which followed.

Mr. Hall, in speaking on the advantages of metallic packing, said: "Many kinds of material have been used for packing. Just at present hemp, flax, rubber, and asbestos and their combinations are widely used; but I believe that just as babbitt metal, as a friction reducing substance, did much to promote the efficiency of modern machinery, so metallic engine packing has already done much and will do much more to promote and maintain the efficiency as well as lengthen the life of power machinery.

"I am speaking more particularly of the plastic or so-called semi-metallic packings. The full metallic packings have long been accorded their rightful place as the most serviceable packing on the main rods of Corliss engines. But there has been a greater delay in acknowledging the efficiency of the semi-metallic packings.

"The reason for this may be found in part in the fact that there is a wide difference in the methods of the manufacture of, as well as of the materials used in this class of packing and there are still in some of the brands on the market some glaring faults that have not been entirely corrected. The handling of semi-metallic packing differs widely in important details from that required for fibrous packing, so there is little wonder that there have been failures.

"The fact remains that the most fruitful cause of the expensive repairs necessary in the engine room and to the general power machinery in any kind of mills is due to the wear of the rods, shafts, and stems caused by the use of the various kinds of fibrous packing. Under the action of steam, compression, and friction from the moving part, these assume in one form or another a hardness and dryness sufficient to cut or score the hardest steel. This deterioration takes sometimes one form, sometimes another. It is sufficient for us here to know that the flax and hemp packings char or carbonize, presenting to the surface of the rod a composition that acts as emery. Mr. Shreffler, superintendent of the National Carbon Company's plant at Cleveland, Ohio, told me that with the best flax packing, his rods would wear down a 32d of an inch every eight or nine months and that every two and one-half years he would have to install a new rod. With asbestos packing we find that wear and compression causes these to assume a rockline formation, ruinous to brass and steel rods and brass sleeves. How many of you have seen the shaft of a centrifugal pump worn a greater part of the distance through under the influence of asbestos? To sum up we may say that while these fibrous packings will pack, they also work great damage to the rods, shafts and stems on which they are used and each installation after the first is effective for a shorter period than its predecessor until the rod has to be taken out and turned down or replaced with a new one.

"To correct these ills, we offer a packing, the base of which is composed of anti-friction metal. This is rolled into very thin sheets. These are covered with a mixture of oil and graphite and then crinkled so that when the sheet is rolled and compressed into a strap or bar, it contains many small cells filled with lubrication. These open as the packing is worn away thus providing a constant film of the best lubricants on the moving part.

"The first installation of this semi-metallic packing is more expensive than one of fibrous packing, but if every subsequent installation were just as expensive the benefits just described would more than offset this difference in cost. The fact is, however, that after the first installation it is much cheaper to maintain it in the boxes. There is no waste to it. It is not necessary to remove any of the old packing when it is time to repack. Simply add one or two rings to the original charge.

Strength
Means Long Life

A FUSE lasts just as long as its strength holds out. No longer! Don't be sidetracked by beautiful theories and high-sounding talking points. It is ruggedness alone—the ability to stand up against repeated blowouts—that counts.

With this idea in mind we have built a housing of exceptional strength around the fusible element of the "Union" Renewable Fuse.

The casing itself is unusually thick and strong. All the component parts—yoke, washer, cap and ferrule—are constructed with an extra margin of strength. And the ferrule instead of screwing to the inside of the casing as in ordinary fuses (which subject the casing to the brunt of the blowout pressure) is screwed and riveted to the outside of the casing to reinforce it at every point.

The "Union" saves more than ANY other renewable fuse.

Strength means LONG LIFE—the thing you pay for. And the thing you get in a "Union" Renewable Fuse.

Why not let us send you booklet telling about other superior features of both the Renewable and Non-renewable types of "Union" Fuses?

They are approved in the very highest degree by the National Board of Fire Underwriters.

Sold by electrical dealers everywhere.

The "Union" saves more than ANY other renewable fuse

Chicago Fuse Mfg. Co.

Oldest and Largest Manufacturers of Fuses Electrical Protecting Materials and Conduit Fittings

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RENEWABLE FUSES

L. A. DeGUERE

Industrial Engineer

Wisconsin Rapids
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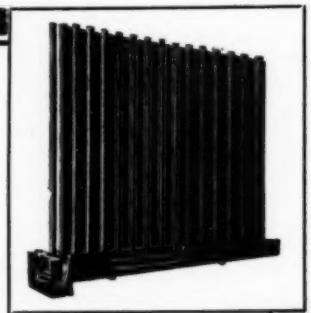
PAPER, CHEMICAL AND GROUND WOOD MILLS, HYDRO ELECTRIC AND STEAM POWER PLANTS, SURVEYS, ESTIMATES, APPRAISALS AND REPORTS

EIGHT MILLION DOLLARS WORTH OF WORK DONE THE PAST YEAR FOR THE FOLLOWING CONCERNS:

Hoosin-Morainville Paper Co.—Paper Mill....Menominee, Mich.
Peshtigo Pulp & Paper Co.—Hydro Electric Plant.Peshtigo, Wis.
Peshtigo Fibre Co.—Sulphite Mill.....Peshtigo, Wis.
Neenah Paper Co.—Paper Mill and Steam Plant.....Neenah, Wis.
Dells Paper & Pulp Co.—Paper Mill.....Eau Claire, Wis.
Cornell Wood Products Co.—Paper Mill.....Cornell, Wis.
Consolidated Water Power & Paper Co.—Paper Mill, Sulphite Mill, Power Plants.....Wisconsin Rapids, Wis.
Wisconsin Valley Electric Co.—Hydro Electric Power Plant .....Wausau, Wis.
Rhinelander Paper Co.—Extensions.....Rhinelander, Wis.



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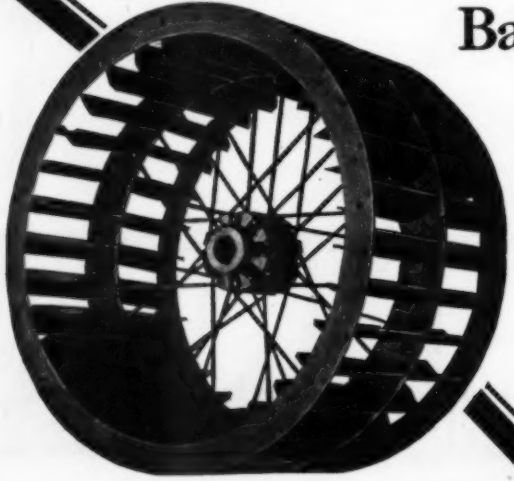
Furnish Plans

For your heating, ventilating and drying system. Years of practical experience on actual paper mill work have given them an insight into the requirements of the paper industry which enables them to handle your problem intelligently. Their services are yours for the asking.



Bayley Chinook Heaters and Plexiform Fans

are the result of their ingenuity and practical knowledge of heating and ventilating requirements. The Chinook is the only heater that can be shipped K. D., and repaired without taking down the entire section. Plexiform fans are built for durability efficiency and ease of operation and are accurately balanced.
Full information on these and other Bayley heating specialties free on request.

BAYLEY MFG. CO.

Dept. B **Milwaukee, Wis.**

This saves both time and packing. Besides the intervals between installations are much greater than with fibrous packing. It is no exaggeration to say that on certain conditions it will last more years than fibrous packing will last months. We have instances right here in the mills of Kalamazoo in which this packing has worn more than ten years on Corliss valve stems with the addition of two or three rings. Placed on any of the various types of hand valves, it is practically a permanent institution and will wear as long as the valve will wear. Besides it will allow the free movement of the stem. You all know that if you set fibrous packing up tightly enough to hold the steam, you generally find difficulty in opening and closing the valve. In fact it sometimes happens that the stem is twisted off in the effort to work the valve under these conditions. I have seen this semi-metallic packing set up as hard as it could be with the aid of a long handled wrench and still allow the stem to work freely."

Mr. Hall then explained the use of his packing as applied to the various kinds of pumps and the Corliss engine, and his address closed with an interesting and enlightening discussion.

The matter of starting a question box, such as has been tried out and worked successfully in the North Eastern Division, was discussed and adopted. The Question Box functions as follows: All members are requested to make notes of any difficulties they may have in any phase of Paper Making and send same to the Local Secretary in form of a question, unsigned. Also to deposit in the Question Box at each meeting any questions they may wish discussed by the entire membership. The Secretary upon receipt of any questions from the membership through the mail, will assign it to the member whom he thinks is most capable of answering that question, with a request that he present his answer at the next meeting.

Wisconsin Local Division of the Cost Association

A very successful meeting of this Division was held at the Valley Inn, Neenah, Wis., Wednesday, March 24, 1921, at which the following mills were represented:

Nekoosa-Edwards Paper Company; American Writing Paper Company; Fort Howard Paper Company; Menasha Paper & Carton Company, Marathon Paper Mills Company; Whiting Plover Paper Company; Outagamie Paper Company; Neenah Paper Company; Interlake Pulp and Paper Company; Peshtigo Pulp & Paper Company; Marinette-Menominee Paper Company; Falls Mfg. Company; Tuttle Press, Appleton; Tuttle Press, Ashland.

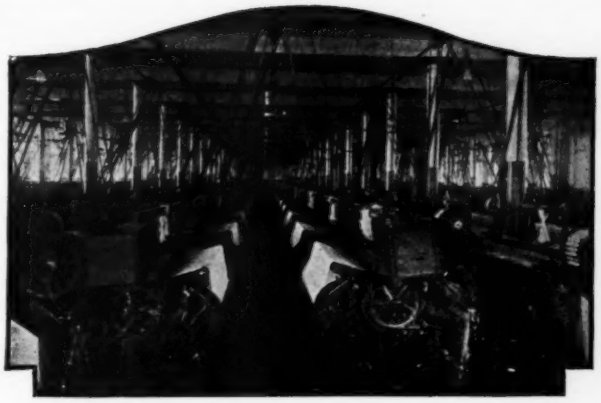
The subject chosen was the Machine Room. A half dozen of those present had brought copies of the various forms used by their companies, which were distributed to those present and explained their system. Several interesting discussions took place regarding these forms, which should prove of assistance to many of those present.

A feature of the meetings held by the Wisconsin Division is that they give up a whole day to their meetings, which are usually called for 9:00 A. M. and continue during the day. This means that those present come fresh to the meeting, instead of at the close of a hard day's work.

The meeting was attended by Mr. T. J. Burke, Secretary-Treasurer of the Cost Association.

Mr. Burke in his address before the meeting gave an account of the steady increase in membership taking place in the Cost Association and the growth in the number of local divisions being formed. He called attention to the opportunity which these local divisions provide for the cost accountants in each district to get together and to discuss topics of general accounting interest and so gradually work towards standardization of methods.

"To my mind," said Mr. Burke, "Standardization is one of the 'crying needs' of the pulp and paper industry today. You have only to note some of the differences in the prices



Cut Your Lighting Bills

Cut your lighting bills! Not by less light but by more daylight. Daylight is free. And it does not tire the eye of your workmen but adds to the general efficiency of your force.

Toco Mill White

reflects the light from windows and skylights into every part of your factory. It lights up the dark corners that slow up production. It gives to your factory a bright, clean, cheerful appearance that adds to the comfort and well being of your employes.

This means greater production. Fewer mistakes. Less accidents.

Toco Mill White is specially prepared for interiors of industrial plants. The formula has been perfected through years of research and experience. It clings tightly to wood, brick or other surfaces. It flows out freely and has great covering capacity. It gives a smooth, even white finish that is both handsome and durable. Supplied in either flat or gloss, as you desire.

FREE Have your stenographer write your name and address on this advertisement for free book "How Pennies Protect Your Dollars" and list of paper mills using Tropical products.

THE TROPICAL PAINT & OIL CO.
"The Firm that Serves with what Preserves"
Cleveland, Ohio

Save the surface and you save all

TROPICAL
Paints—Enamels—Roofing Materials

Dominion Engineering Works, Ltd.

MONTREAL, QUEBEC

Designers and Builders of

HIGH SPEED NEWS MACHINES

Of Modern Design and Construction. Fourdrinier and Cylinder Machines of All Kinds. ROTARY SCREENS (System Spangenberg) for Pulp or Paper

HYDRAULIC TURBINES

Of the Largest Sizes and Highest Efficiencies

SPIRAL PUMPS for Medium and Low Heads. *Built from* I. P. Morris Designs, *Under Arrangement with* The Wm. Cramp & Sons Ship and Engine Building Co.

Operating Modern Machine Shop and Iron Foundry equipped to handle the largest classes of

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PIONEERS *Three Departments Specializing for Service* ORIGINATORS

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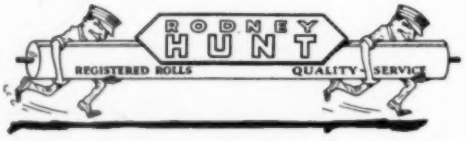

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Water Controlling Apparatus
Wood and Steel Penstocks, Flumes, Canal Gates, Valves, Hoists, Screens, Fittings.

Power Transmission Equipment
Heavy Shafting, Bearings, Hangers, Clutches, Pulleys, Gears, and Accessories

A Book of Complete Information "Power Development of Small Streams" 178 pages, illustrated, $3.50

Write Department of Water Power Equipment

Also Textile Wet Finishing Machinery for Goods in Roll or String
Write Textile Machinery Department for circulars

RODNEY HUNT MACHINE COMPANY, 45 Mill St., Orange, Mass.
ESTABLISHED 1873

quoted recently to believe that statement. Certainly these prices are proof positive, if such proof were needed, that although the pulp and paper industry has a number of associations, these associations are not attempting in any way to control selling prices. Of course, we are forbidden to do that anyway, and certainly the industries are keeping in the center of the straight and narrow path. In fact I think the path is a good deal too narrow and I think this because concerns are today going out and selling their products *at a loss.* Of course, they cannot continue to do this indefinitely and it means that sooner or later there will be failures and as Mr. Emmet H. Naylor says so well in that admirable book recently published by him called 'Trade Associations,' 'Every business failure within an industry is a blow to that whole industry because competition which brings out failures often kills off the strong as well as the weak through a blind disregard for their relations. In the industry the small producer is often just as necessary a link in the chain as a large producer, and since a chain is no stronger than its weakest link, the weak may cause the downfall of the strong.' "

Mr. Burke spoke a few words regarding the "Fundamentals," representing those things which the Cost Association considers to be fundamental for every cost system. "They have been drawn up," said Mr. Burke, "with a view to making a start toward standardizing cost accounting procedure generally. It has been decided to call the manufacturers together in the following groups, namely, Board, Book, Building, Cover, Industrial, News, Pulp, Tissue, Writing, Wrapping and Specialties. It is hoped that each group will select a strong committee which will gradually evolve the best methods of dealing with the particular practical difficulties encountered in each group. It is hoped in this way that we shall be better able to get the co-operation of executives in general.

"I want to point out that these groups should not be confused with the local divisions. The latter will continue to function just as before, their purpose being to provide opportunities for the cost men in each district to get together in order to discuss topics of general accounting interest, whilst the groups will provide opportunities for both executives and cost men, representing concerns making the same products, to meet with a view to standardizing their cost accounting procedure. It should be clearly understood that the Cost Association has not any standard cost system which it wants all mills to adopt. All the Cost Association does is to suggest and advise and any changes made by member mills are purely voluntary on their part."

Miami Valley Division of Superintendents Meet

A special meeting of the Miami Valley Division of the American Pulp & Paper Mill Superintendents' Association was held at the Y. M. C. A., Hamilton, O., Saturday evening, March 26th.

The election of officers for the ensuing year was held with results as follows:

President, Mr. A. O. Rolfe, Champion Coated Paper Co., Hamilton, O.; vice-president, Mr. W. W. Server, The Miami Paper Company, West Carrollton, O.; secretary-treasurer, Mr. C. C. Stewart, The American Writing Paper Company, Franklin, O.

Mr. Coughlin, President of the Michigan Division and Mr. P. S. Massey, Secretary-Treasurer of the National Association, were present and gave very interesting accounts of the activities of the various other Divisions.

A tentative program as outlined for the coming year promises some very interesting and instructive meetings.

C. F. Jewell Re-elected President of Northern New York Div. of Supts.

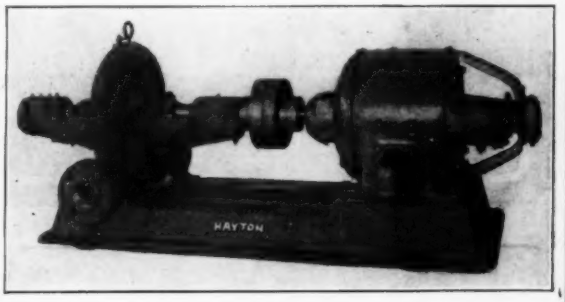
Corwin F. Jewell was re-elected president of the Northern New York division of the American Paper and Pulp Mills'

SAVE POWER
AND MONEY

BY USING

HAYTON
CENTRIFUGAL
PUMPS

"With us it is an engineering problem"



HAYTON CENTRIFUGAL PUMPS are designed especially to meet the requirements of pulp and paper mills. We do not build a pump after OUR ideas and then try to sell it to you. We make a study of YOUR peculiar problems, and then build a pump to suit your needs. Hayton Pumps are built for hard, continuous operation, and will stand up under the most severe usage. We guarantee the highest efficiency, and maximum economy in power consumption.

We also build a full line of Sandusky Triplex pumps.

Let us have your specifications for quotations

Hayton Pump & Blower Co.

Manufacturers

APPLETON, WISCONSIN

Real Merit Placed

Lindsay Fourdrinier Wires

In Many Mills

HONEST SERVICE
KEEPS THEM THERE

They are ready to serve you

The Lindsay Wire Weaving Company

Collinwood Sta., Cleveland, Ohio

"Ask any Papermaker"

FOURDRINIER WIRES

Dandy Rolls *Cylinder Molds*

Brass, Copper and Iron Cloth

Bank and Office Railings

WIRE SIGNS

Cheney Bigelow Wire Works

Established 1842 SPRINGFIELD, MASS.

Superintendents' Association at the annual meeting held at the English room of Hotel Utica on Friday, April 8.

Other officers chosen are: Vice-president, Lowell N. McIntyre; secretary-treasurer; T. H. Hammond.

J. W. Zeliph of the Mutual Life Insurance Company spoke on "Compensation Insurance"; C. C. Schneider on "Rosin and Engine Sizing," and J. B. Rogers of the General Electric Company at Schnectady gave an illustrated talk on "The Relation of Electric Drives to Paper Mill Machinery."

A banquet was served at 6 o'clock following the meeting.

Eight Colors with One Impression

What will seem to be miracles to the general public and will surely be of the keenest interest to the printing trades will be demonstrated in a practical way at the Fourth National Exposition of printing, lithographing, bookbinding, publishing, advertising, stationery and allied lines, to be held at the Twelfth Regiment Armory, New York City, April 25 to 30, 1921. The most notable new invention will be the new Prizmatone machine which, it is claimed, prints eight colors at once, four on top and four below. It was designed for newspaper colored supplements and the inventor declares will print clear, beautiful pictures on cheap news stock. Color printing, always susceptible of development, as it has never been perfected, will especially command the interest of the American National Publishers' Association, and the Associated Press, both national bodies being in convention at the Waldorf-Astoria coincidentally.

Warren B. Bullock, Director of Publicity

The establishment of what will be known as the Information Service of the American Paper and Pulp Association has been decided upon by the executive committee, and Warren B. Bullock, former newspaper man, has been selected as director, taking his new position at once.

The establishment of this service has been under consideration for several months, and plans for its operation have been discussed to a considerable extent among some of the leaders in the industry under the subject of educational work. It was finally decided, however, to avoid confusion of the new work with that of the joint educational committee of the Technical Association by giving it the title of Information Service, rather than that of an Educational Department.

The new department does not contemplate any assumption of work now done by any of the affiliated associations, but is rather a clearing house of information from and for the affiliated organizations. In addition it will have as one of its most important functions the collection of official data from governmental and similar sources of importance to any branch of the paper industry, and the distribution of this material to the individual manufacturer, or the groups interested.

Mr. Bullock comes to the American Paper and Pulp Association after three months of work as secretary of the National Forestry Program Committee which has been leading in the campaign for the coalition forestry policy as approved by the United States Forest Service, and before that was director of the extension service of the New York State College of Forestry at Syracuse. Before the war, he was reporter and editor and special correspondent for newspapers at Milwaukee, and was for a year before entering the service in charge of publicity for the National Lumber Manufacturers Association.

He went into the first officers' training camp at Fort Sheridan, Ill., was commissioned second lieutenant in the quartermaster corps, assigned to transportation, and when the armistice was declared was captain and senior instructor in the Motor Transport corps school at Jacksonville, Fla., the mother school of that corps on this side. He went to Syracuse to handle the extension service when Dr. Baker was dean of the college.

If--?

IF you are seeking in your distributor the qualities and characteristics that mean successful merchandising at a reasonable profit, the creation of increased demand for your product (providing you've got the "goods"); the establishment of mutual confidence and hearty co-operation; the constant practice of the doctrine of the *"Square Deal—as much to those from whom we buy as to those to whom we sell—including our associates—."*

If you're looking for all these—and more—(although we claim no monopoly of these virtues) please let us hear from you.

American Paper Mills Corporation

Everything in Paper and Kindred Products

Offices—237 Lafayette Street
Warehouse—295-301 Lafayette Street
Telephones Spring 9733
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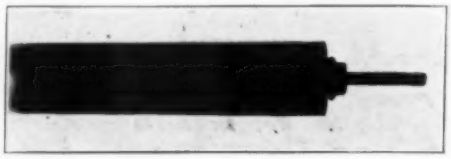


Rubber Covered Felt Rolls

DO YOU KNOW

That we cover Felt Rolls with Rubber that give better service than Brass Covered Rolls?

Our Rolls wear perfectly smooth. When once installed they require no further attention.

Write for names of satisfied customers using our rolls.

We Are Rubber Roll Specialists
Our Press Roll Stocks Are
the BEST on the Market.

The American Wringer Co.

Dept. R WOONSOCKET, R. I.

When it is a matter of

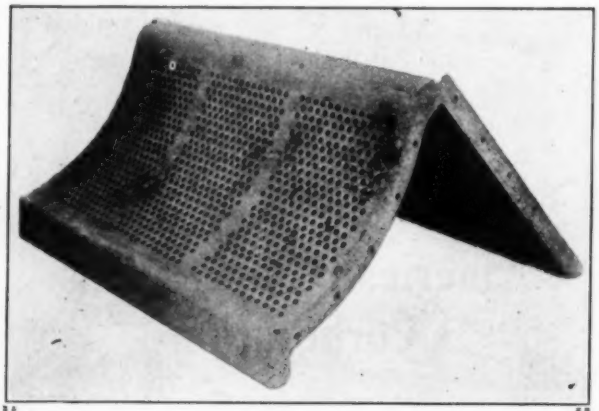
CHIPPER and BARKER KNIVES;
RAG CUTTER, ROTARY CUTTER
and PAPER TRIMMING KNIVES,
FLY BARS and BED PLATES
for BEATERS and WASHERS,
JORDAN ENGINE FILLINGS,

THINK OF

BOLTON QUALITY

JOHN W. BOLTON & SONS, Inc.
LAWRENCE, MASS.

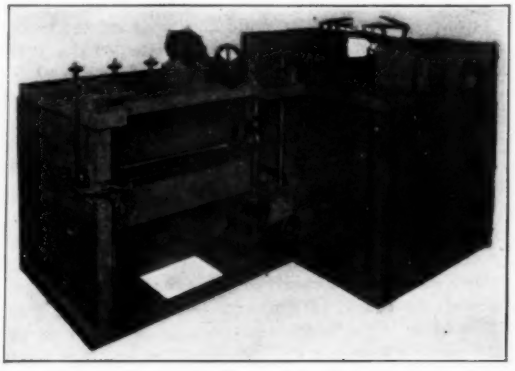
Intensive specialists in the manufacture of uniformly high grade machine knives for the pulp, paper and board industry



Because there are no moving parts this is a very simple but very efficient device. Patent No. 1,271,426 issued to Mr. Brownell Buehler, July 2nd, 1918.

The Shartle Continuous Beater Company

MIDDLETOWN, OHIO



TRIMBEY & ALLEN

The combination of the Trimbey & Allen Automatic Continuous Mixing Machine and the Trimbey Automatic Consistency Regulator gives:

1—Uniformity of product; saves power, labor, maintenance cost and floor space.

2—The use of the Trimbey & Allen Continuous Mixing System replaces the uncertain manual control of the proportions of the various paper making ingredients by an accurate mechanical control.

3—This means better running conditions on the machine and increased production of paper.

TRIMBEY & ALLEN

M. G. TIBBITTS, Sales Manager

GLENS FALLS, NEW YORK

Colin Gardner Paper Co. Electrified

Complete electrification of all the machinery in its box-board plant, looking to the abandoning of all steam engines now used in driving the huge beaters and other heavy machinery in its mill has been made possible by the completion this month of a new quarter of a million dollar power plant by the Colin Gardner Paper Company, of Middletown, Ohio.

When the present plans are completed and the electric motors are installed replacing the old and cumbersome steam-driven shafts, the Colin Gardner plant manufacturing high grade box board will be one of the most modernly equipped mills in the country. The work of connecting up the beater machinery to individual motors that have replaced the former steam driven shafts is now being carried on, the engineers planning to have the entire electrification of the mill completed within the next two months.

The new power plant, which will produce and transmit the electrical current for the entire operation of the paper mill, is a two-story building, and has been constructed as an addition to the present power house. The building is of brick and concrete throughout with a monolithic gypsum roof. Window and ventilating space has been provided to give a light and airy interior, building has been designed for installation of two 1,500 K. W. general electric extraction turbo generator sets, two 300 K. W. turbo generator sets together with an exciter set and a Skinner reciprocating engine unit, steam being furnished from present boiler plant of six 500 H. P. boilers, exhaust and extracted steam from turbines being piped to paper mill for machines and other equipment where low pressure steam is demanded.

A low pressure pumping plant together with a new mill service pumping installation has been installed as a part of this new work, the low head station being built in the rear of the power house and is supplied by eight wells, this plant delivering cooling water for condensers and also to mill service pumps from whence it is piped directly to mill equipment.

The beaters are now being rearranged and each connected up to a separate motor by means of an apparatus known as the Lenix drive. The Lenix drive shaft is connected to a 75-horse power motor, and the motors being individually attached will represent great savings in power, as heretofore the beaters have been attached in pairs or groups to a huge steam driven shafting beneath the floor of the beater room.

The operation of the newly equipped plant will be as before under the direct supervision of Chief Engineer W. Fulton of the Colin Gardner and Harvey interests.

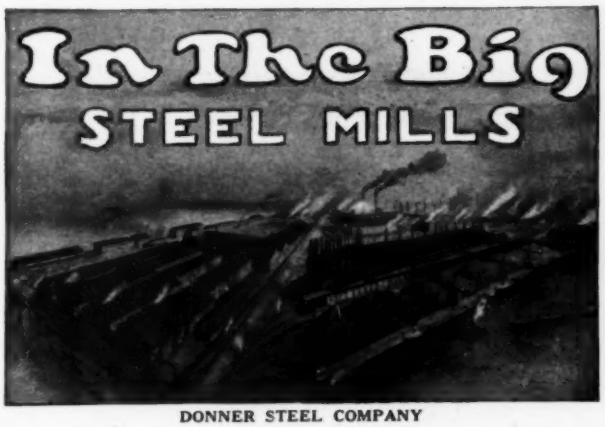
The entire reconstruction work was carried out by The Management Engineering and Development Co., of Dayton, O.

Marinette & Menominee's New Office Building

The office force of the Marinette & Menominee Paper Co., Marinette, Wis., is now nicely installed in the new office building at the Park Mills, recently completed. It is a modern office structure, equipt with every convenience and comfort. The building is located just this side of the mills and is 80x40 feet in dimensions. It is built of concrete and brick with the main entrance on Riverside and a side entrance leading to the plant.

The building has two floors, the first and main floors, and both are divided into offices. The main floor consists of the general office occupying a space of about 36x60 feet and leading from it the private offices of officials and stenographers. The partitions consist largely of glass and all look into the main office. The private offices are all about 15x14 feet. That of President Delbridge is on the east side and is ornamented by a fireplace. Leading from the president's office is the directors' room with fireplace and suitably furnished. Then come the office of the stenographers, the office of Secretary Frank Silman and that of Construction Engineer D. G. Moon.

On the first floor are the offices of General Supt. P. J.



DONNER STEEL COMPANY

Diamond Soot Blowers Mean Greater Profits

WHEREVER industry uses power generated by steam, in large quantities, there you will find Diamond Soot Blowers. This is particularly true in the steel industry, where in addition to the incentive of fuel saving resulting from the maintenance of clean heating surfaces in the boilers, there is the further important consideration of keeping machinery in all departments operating at full capacity—a result generally possible only when boilers are operating at highest ratings and efficiencies.

In addition to the economies resulting from their general application—economies such as a fuel saving of 4 to 8 per cent and an increase in boiler efficiency of 3 to 4 per cent—Diamond Soot Blowers are an especial source of dividends in the steel industry because of their adaptability to the cleaning of boilers fired by blast furnace gas and waste heat from open hearth furnaces.

Among a few of the several hundred iron and steel plants which are increasing dividends with Diamond Soot Blowers, the following are typical:

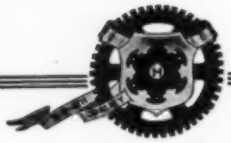
Andrews Steel Company	Carnegie Steel Company
Lukens Steel Company	Bethlehem Steel Company
American Rolling Mill Company	Trumbull Steel Company
Illinois Steel Company	Atlantic Steel Company
Donner Steel Company	American Steel Company
Wisconsin Steel Company	Ohio Forge Company
Pittsburgh Steel Company	Midvale Steel Company

If your boilers are not equipped with Diamond Soot Blowers you can profitably follow the example of the big steel mills.

Write for Bulletin 290

DIAMOND POWER SPECIALTY COMPANY
Detroit, Michigan

Diamond
SOOT BLOWERS - SAVE 4 to 8% FUEL



Plant and General Office at Cleveland, Ohio

Hill Clutch Equipment for Transmitting Power

In Pulp and Paper Mills

THE HILL CLUTCH CO.

General Office and Plant CLEVELAND, OHIO
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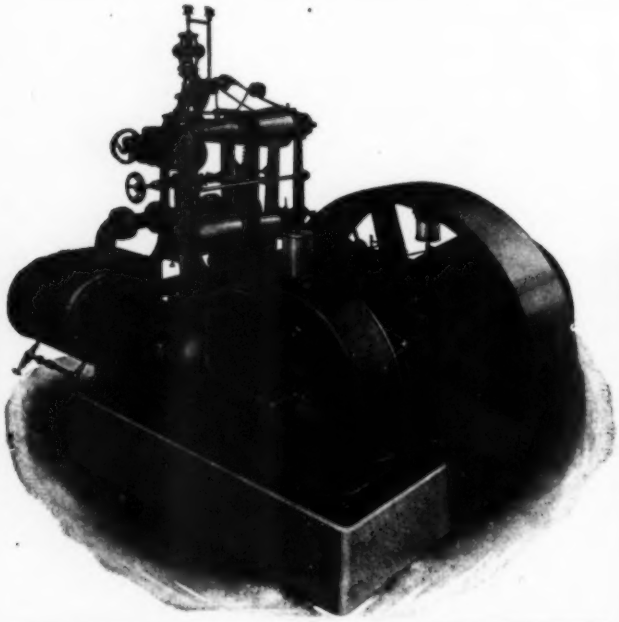
Ball Engines

Are now built in

PITTSBURGH

By the

ERIE BALL ENGINE CO.

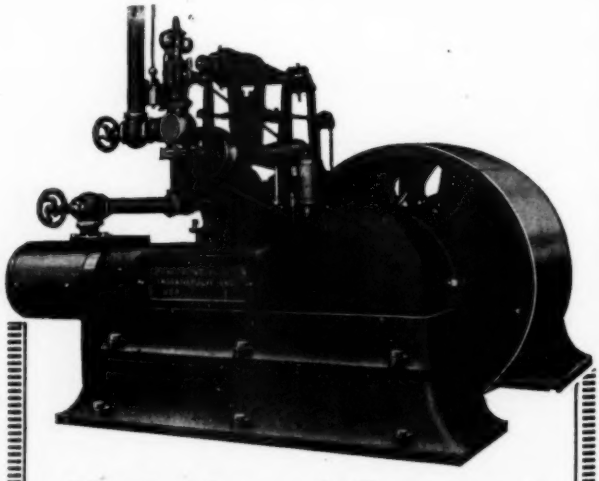


Variable Speed Engine

The engine illustrated above is especially designed to drive paper machines, giving continuous and reliable service. A patented safety device protects your employees and plant.

THE BROWNELL CO., Dayton, Ohio

SEND FOR BULLETIN E-4



Variable and Constant SPEED ENGINES

Paper Mill Economy is assisted very materially by the installation of High Grade Variable Speed and Constant Speed Engines.

Send for List of Installations and Catalogs

CHANDLER & TAYLOR COMPANY
Indianapolis, Indiana.

Lamereaux, the timekeeper's office, the first aid room, the kitchen and the recreation hall. The latter is 60x40 feet, and will be just what its name indicates, a place of recreation for all the employes of the company. It will also serve as the dining room and a completely equipt kitchen has been installed. Cooks will prepare meals and lunches for the office and mill employes and they will be served at cost. This is expected to be a much appreciated convenience especially in inclement weather. Shower baths have also been installed in the basement for employes. The grounds about the office are to be leveled and beautified and a tennis court will be installed for the use of employes.

Some time ago the company built a high wire fence along the Riverside front of its entire mill property and also curbed the street on both sides with concrete. Besides these improvements a large brick storehouse was built last year. The boiler house was entirely rebuilt and new boilers are now being installed and much new machinery was put in to replace worn-out machines. This with the new concrete dam made the company's construction program in 1920 a large one. If business conditions warrant it the company may have as large a building program this year.

Peshtigo Mill Now Making Pulp

The Peshtigo Fiber Company's large pulp mill at Peshtigo, Wis., has begun operations and is turning out its first finished product. The big plant, which covers several acres of ground on the east bank of the Peshtigo river, was erected at a cost of nearly a million dollars.

From 80 to 100 men will be employed and sixty tons of pulp will be manufactured daily when the full capacity is reached. Forty tons of this pulp will be bleached and twenty tons unbleached.

Fifty per cent of the product of the mill will be used by the Peshtigo Pulp and Paper company for the manufacture of paper at its plant at Peshtigo. The balance will be disposed of to mills within a radius of fifty miles of Peshtigo, it is said.

The Peshtigo Fiber company was promoted by J. P. Neugent of Green Bay, and organized in January, 1920. The stock, of which there is $600,000 common and $600,000 preferred, is held by Green Bay, Peshtigo, Marinette and Appleton investors.

The officers of the Fiber company are: President, J. P. Neugent, Green Bay; vice president, Frank Lauerman, Marinette; secretary, John A. Kittell, Green Bay; treasurer, Nick Dohr, Appleton, and general manager, D. F. O'Connell, Green Bay.

Stock Is Increased

The Riverside Fibre and Paper Company of Appleton, Wis., filed an amendment to its articles of incorporation with A. G. Koch, register of deeds, increasing its capital stock from $400,000 to $1,000,000. The amendment is signed by T. W. Orbiton, Vice-president, and S. W. Murphy, Secretary. The stock is divided into $10,000 shares of $100 each.

S. B. Monroe Heads Mac-Sim-Bar

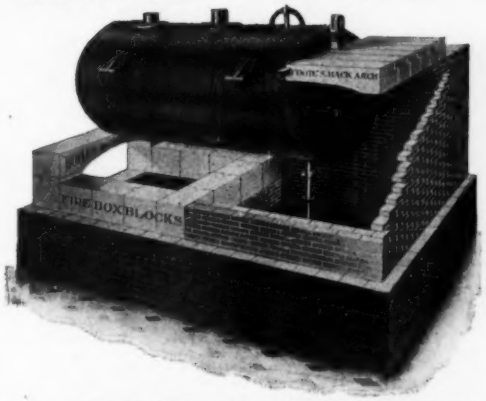
Two changes in the presidencies of two Otsego Paper companies have resulted from the death recently of M. B. McClellan, president of the Mac-Sim-Bar Company.

S. B. Monroe retires as president of the Wolverine Company and goes to the Mac-Sim-Bar as the successor of President McClellan.

C. A. Buskirk, formerly vice-president and general manager of the Wolverine, becomes its president.

Forestry Branch Circular No. 12 of the Forestry Branch of the Canadian Department of the Interior, is a review of the Empire Timber Exhibition in London last July, and devotes considerable attention to the Canadian exhibit.

SAVE *LABOR*
REPAIR CHARGES
REPLACEMENTS
STEAM POWER



Use "STEEL MIXTURE" Boiler Settings

They reduce each of these expense items to a minimum. How this is accomplished becomes apparent when you have examined the "Steel Mixture" construction. The material is highly refractory. It is made into large smooth blocks which make for economy of time and labor in installation. Clinkers do not adhere to the hard, almost jointless surface, resulting in fewer repair jobs and reinstallations. The tight, tongue and groove settings prevent air leaks and effect a saving of fuel and power.

This improved boiler setting is certain to prove an economy to you as it has to more than 9000 satisfied users throughout the country. Boiler Door Arches, Fire Box Linings, Back Combustion Chamber Arches, Ignition Arches, Blow-Off Pipe Protectors and Dutch Ovens fitted to your individual setting and SHIPPED ON RECEIPT OF ORDER.

McLEOD & HENRY CO.
TROY, N. Y.

Send This Clipping for New Catalogue

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& HENRY CO.,
Troy, N. Y.
Gentlemen:
Please send, without obligation, your new catalogue on "Steel Mixture" and information covering items checked below.

☐ Boiler Door Arches.
☐ Back Combustion Chamber Arch.
☐ Blow-Off Pipe Protectors.
☐ Fire Box Lining Blocks.
☐ Dutch Ovens.
☐ Complete outfit (give name and style of boiler).

Name .....

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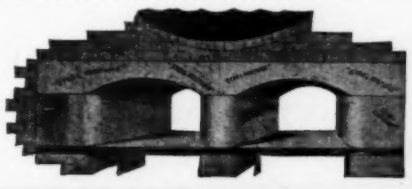

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Mill representation invited. Samples wanted

LET us have your samples as we are ready with the cash for any quantity of over-runs, close outs, or rejected lots. Book papers, Bonds, Wrapping papers and Tissue papers.

ESTABLISHED 1882

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5716 Euclid Avenue, Cleveland, Ohio

Engineering Service for Paper Mills
Construction and Production

BOOK, BOXBOARD, BONDS AND LEDGERS, TISSUE, ROPE MANILAS AND SPECIALTIES

H. B. PRATHER

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Complete Designs Pulp and Paper Mills Steam and Electric Power Plants. Equipments

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Special Sulphite Mill Equipping

Agents for the Heiskanen Pulp Bleaching Apparatus.

THE

MANAGEMENT ENGINEERING AND DEVELOPMENT CO.

7TH FLOOR CITY NATIONAL BANK BLDG.,
DAYTON, OHIO.

DESIGN, CONSTRUCTION AND OPERATION
OF
PULP, PAPER AND FIBRE MILLS
WATERPOWER DEVELOPMENT
STEAM POWER PLANTS.

PLANS AND SPECIFICATIONS
EVALUATIONS AND REPORTS
··CONSULTATIONS··

PULPWOOD FOR SALE

Fifteen Thousand Cords Drum Peeled Pulpwood
Four-foot Lengths. 90 Per Cent Spruce. Delivery F. O. B. Cars Southern Vermont. For Terms Apply to

A. E. POPE, Agent, 50 Congress Street, BOSTON, MASS.

Combined Locks Co. to Establish General Offices in Appleton

General offices of the Combined Locks Paper Co., Lakeview Paper Co. and the Valley Pulp Co., closely affiliated concerns, will soon be housed in the old First National Bank Building of Appleton, Wis., which they recently purchased.

Minor offices will be maintained at all three of the mills but general officers will have their headquarters at Appleton. Major A. J. McKay, vice-president and general manager of all three mills, will establish headquarters there instead of at Combined Locks. D. E. Reese, treasurer, also will have his office there. L. L. Alsted of Milwaukee, is president of the three companies.

Mr. Alsted, Mr. McKay and their associates began their expansion in the Fox River Valley last year when they purchased the Lakeside Paper Co. at Neenah, and organized the Lakeview Paper Co. to operate the mill. Recently these men purchased the Kaukauna Pulp Co. plant at Kaukauna and organized the Valley Pulp Co.

An Erroneous Report

The statement published in the columns of The Paper Industry last month that a stock dividend of $1,000,000 had been declared by the Michigan Paper Company, Plainwell, Mich., increasing the capitalization of the company to $2,000,000, was an error, being merely a rumor which was circulated and has no foundation in fact.

Installing Second Machine

Work is progressing nicely on the erection of the second large paper machine at the new plant of the Eddy Paper Company at Three Rivers, Mich. It is probable the new machine will be ready to put in operation in a month or six weeks.

Fourth Paper State

It is reported that Michigan now ranks fourth among the states in the production of paper. More than $150,000,000 is invested in the industry in that state and the paper mills employ more than 11,000 men and women whose wages total in excess of $18,000,000 a year.

Washington Book Mill Is Successful

A new $30,000 boiler plant has been completed at the Cascade Paper Co., Steilacoom, Washington. The company which has been operating just two years, has established an enviable record among Tacoma manufacturing plants, and on the first of the year the officials of the concern announced a stock dividend of 20 per cent and the increasing of the capital stock from $600,000 to $1,000,000.

Despite the fact that the company was organized during the uncertain marketing conditions of the war and faced the fluctuating market immediately following the war, the declaration of the stock dividend indicates that a great amount of success has been reached by the concern.

The principal output of the plant is book paper and chemical writing paper. Since the plant started operations a total of 10,000 tons of paper has been manufactured, with an approximate value of $2,000,000. This paper has been shipped to all parts of the West Coast and to the Orient.

The principal material used in the manufacture of their paper is old magazines. This waste material is shipped in from all parts of the Coast and as far east as Denver. More than 350 tons of this waste paper is used every month at the plant.

During the coming year the company, which is the only one of its kind in the state, plans to increase its output, and will attempt to develop the Oriental market, which is said to be one of the best future markets for paper in the world.

BAILEY FLUID METERS
CUT STEAM WASTE

and give reliable, comprehensive information to those whose interest is centered in efficiency and operating costs.

Bailey Fluid Meter—Type C2, Class 24

Three kinds of correlated information are shown on chart.

1—The rate of steam flow
2—The steam pressure
3—The steam temperature

among BAILEY FLUID METER users are

American Writing Paper Co.
Great Northern Paper Co.
International Paper Co.
Dennison Manufacturing Co.
Laurentide Co., Ltd.
St. Maurice Paper Co., Ltd.
The Riorden Co., Ltd.
Strathmore Paper Co.
Lake Superior Pulp & Paper Co.

Let Our Engineers Help You

The BAILEY METER COMPANY
2023 East 46th Street, CLEVELAND, OHIO

Disc Ventilating Fans

DESIGNED FOR HANDLING

Steam, Smoke, Vapors, Light Solids, Etc.

A genuine combination of durability and real efficiency.

Send for Bulletin No. 30

We build fans and blowers for every purpose.

WHAT IS YOUR PROBLEM?

GARDEN CITY FAN COMPANY

McCormick Bldg. *Established 1879* Chicago, Ill.

Millspaugh Suction Rolls and Shower Pipes

Over 700 Rolls in Service to date. 9 Rolls Per Month Shipped Since January! 48 Orders in our shop December 1st. In less than one year 50 repeat orders for Suction Rolls from satisfied customers who had one or more already in service.

More Than 7 Miles Millspaugh Shower Pipes Shipped to Date

THE SANDUSKY FOUNDRY AND MACHINE COMPANY

Sandusky, Ohio

You Can Rely on *Davis* Regulators

The Davis Pressure Regulator in paper mills is positive in action because gravity controlled by weighted lever arm — no packing — no springs nor diaphragm to get out of order.

It reduces high pressure steam to the exact lower pressure at which auxiliary apparatus, such as steam beaters, slitters, cutters, etc., give greatest economy. Supplies uniform pressure regardless of fluctuations in boiler pressure.

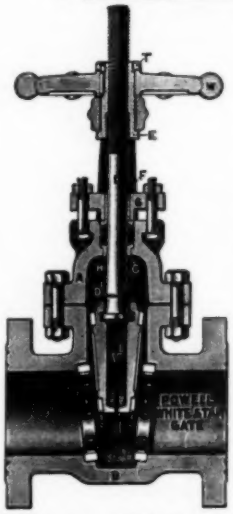
The extensive line of Davis steam savers is described in a catalog full of steam-saving data valuable to the mill operator. Write the G. M. Davis Regulator Co., 414 Milwaukee Ave., Chicago.

DAVIS VALVE SPECIALTIES

STEAM SAVERS SINCE 1879

POWELL VALVES

(Especially The "White Star" Valve)



Valves for Steam, Water, Gas, Oil or Air to meet every mining requirement.

Gate Valves with rising or non-rising spindles. Screwed or flanged ends, in brass, iron or steel.

If your dealer cannot furnish you with

Powell "White Star" Gate Valves

Write us

THE WM. POWELL CO.

DEPENDABLE ENGINEERING SPECIALTIES.

CINCINNATI, O.

Envelopes to Be Made in Seattle

An addition to Pacific Northwest manufactured products will be made from a new plant to be established in Seattle, by the Northwest Envelope Manufacturing Company, which plans to have its factory in operation within a few months.

This $50,000 plant will have a daily capacity of upward of 300,000 finished envelopes, or more than 1,800,000 a week.

At present there is no envelope plant in the Pacific Northwest, the nearest being in Denver and San Francisco.

Pulp Mill to Be Built in Idaho

Idaho Falls has been selected as the site of a $5,000,000 pulp mill, to be constructed by the Howard Pulp & Paper company, a new concern incorporated under the laws of Idaho for $25,000,000 according to College Kollinz, of Denver, Colo., president of the company.

Mr. Kollinz was in Ogden recently conferring with officials of the forest service. This project, forest officials say, will cover pulpwood from the Teton forest, and possibly from the Wyoming and Targhee forests. No formal application for forest service timber has been made.

Pulpwood Breaks All Records

The 1920 consumption of pulpwood in California, Oregon and Washington exceeded by 23,000 cords, or 7.4 percent, the greatest previous record which was in 1919. Similarly in 1919 consumption of pulpwood exceeded by 18.6 percent that of 1917, the previous record. The 1919 production of woodpulp fell short of the 1917 production by nearly 3 percent while the 1920 production exceeded the 1917 record by 14 percent.

This statement is based upon the following complete figures published jointly by the Bureau of Census for 1919 and the Forest Service of the United States Agriculture, in co-operation with the American Paper and Pulp Association, for 1920.

British Columbia Pulp Markets

It is reported that the pulp markets of the Orient will continue to take British Columbia pulp, and the boundaries of the territory supplied by British Columbia pulp mills have been extended to Australia. All consumers are tied up with long term contracts. The extension to Australia is interesting because hitherto the mills have shipped only paper. No effort is being made to touch European markets.

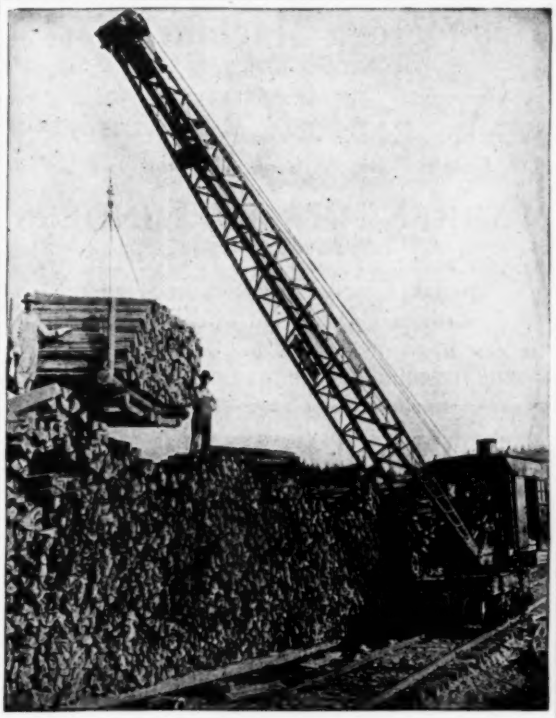
The Paper Industry in California

The paper and paper box industry of California was represented at the "paper box" luncheon of the California Industries Association recently by manufacturers of paper and paper boxes from all parts of California, making the first time in the history of the industry that such a statewide gathering has been held.

Various speakers traced the growth of the industry which, at the present time, has three mills manufacturing board paper with an output of 250,000 tons of box board per day and an investment of $7,500,000; and twenty-six factories making the finished product in cartons and boxes with an investment of $5,000,000.

Ray E. Wantz Heads Manufacturers

Ray E. Wantz, secretary and manager of the Rockford Paper Box Board Co., Rockford, Ill., has been elected president of the Manufacturers and Shippers' Association, of that city, for the ensuing year. Mr. Wantz has been in the local paper manufacturing business for many years. He is prominent in the association work and his selection as head of the Manufacturers Association is expected to bring new life and leadership into that organization.



BROWNHOIST

Handling Materials at the Mill

IS YOURS one of the many mills which handles considerable pulp? Some of these have found it to be more rapid and economical to do this handling with a Brownhoist locomotive crane. A Brownhoist will not only place the pulp wherever it is needed, but will handle your coal, switch the cars and take care of innumerable jobs which come up around the yard. If you have much handling to do, our long crane experience should be of use to you. We will gladly give you any information for the asking.

The
Brown Hoisting Machinery Co.
CLEVELAND, OHIO, U.S.A.

Engineers and Manufacturers of Heavy Dock Machinery, Bridge Cranes, etc., as well as smaller Cranes and Hoists

Branch Offices in New York, Pittsburgh, Chicago and San Francisco.

Ticonderoga Machine Works
TICONDEROGA, N. Y., U. S. A.
MANUFACTURERS OF
WARREN IMPROVED CALENDER DOCTORS
With Flexible Blades, Universal Adjustment and Control
(PATENTED)
WARREN IMPROVED PATENT DOUBLE DRUM WINDERS
Patent BALL VALVE Hydrant
Stock Circulating Systems *and*
other Paper Mill Specialties
SEND FOR OUR BULLETIN

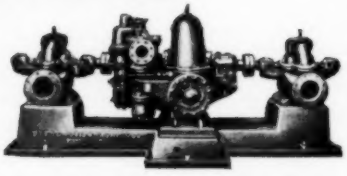
Remember
WM. A. HARDY & SONS
FITCHBURG, MASS.
Originators and Oldest Manufacturers
OF THE
Cast Bronze Screen Plate
ALSO SPECIALIZE IN
Acid Resisting Digester Parts

UNION SCREEN PLATE CO.
Fitchburg, Mass., U. S. A. Lennoxville, P. Q., Canada

UNION BRONZE SCREEN PLATES
(Best phosphorized Cast Metal)
Old Plates RECLOSED and RECUT to accurate gauge
UNION BRONZE SCREWS for Screen Plates
Immediate Delivery of the Largest Orders. Satisfaction Guaranteed
The Witham Screen Plate Fastener, Patented
THE ORIGINAL THE BEST

FOR SALE
2—1800 lb. Brand New Beaters, never installed, Rolls 61"x48", immediate delivery. For detailed specifications and prices Address Box 1075, c/o The Paper Industry.

SCREEN PLATES *and*
DANDY ROLLS
Watermarking a Specialty
Central Manufacturing Co.
The Quick Service House
KALAMAZOO MICHIGAN

EARLE
CENTRIFUGAL PUMPS
For Service
Where
Quality
Counts

THE EARLE GEAR & MACHINE CO.
4711 Stenton Ave., Philadelphia, U. S. A.

WYCKOFF WOOD PIPE

PRESSURE PIPE THAT NEVER BURSTS.
Built in sizes 1 inch to 48 inches.
The Paper Industry is successfully using thousands of feet of this Pipe and they find it to be the best conveyance for Paper Stock and Acids that can be obtained.
The Pipe of Service
DURABLE—ECONOMICAL—EASY TO INSTALL
Built of selected Canadian White Pine, Wyckoff Wood Pipe is wound with **steel bands whose tensile strength is 58,000 to 65,000 lbs. per square inch.** The experienced engineer selects a pipe of proven dependability. Wyckoff Wood Pipe, during the past 65 years, has built a reputation that stands the keenest competition. It has been, during this time, the choice of the largest pipe users in the world. We also manufacture a high grade underground steam pipe casing.
Write today for catalog and prices
A. Wyckoff & Son Company
1855 Elmira, N. Y., U. S. A. 1920

Minet Berton McClellan

Born, January 27, 1864.

Died, March 26, 1921.

Funeral, Otsego, Michigan, March 29, 1921.

His early business life was spent in Minneapolis associated with his brother, Fred L. McClellan, in the wholesale paper business.

August 25, 1897, he was married to Margery Bardeen and in March, 1898, he moved to Otsego, Michigan, and became associated with his father-in-law, G. E. Bardeen, in the management of the Bardeen Paper Company.

In the year 1905, the Mac Sim Bar Paper Company, Otsego, Michigan, was organized and he became the President and Manager which office he held at the time of his death.

He is survived by his wife, Margery B. McClellan, and two daughters, Margery and Dorothy; a brother, Fred L. McClellan, and two sisters, Mrs. W. E. Ford and Eva VanFleet.

He was a member of the Chicago Athletic Club and Hamilton Club of Chicago; Park Club and Country Club of Kalamazoo. He was also active in all local organizations, Chamber of Commerce, Red Cross, Advisory Board of The Salvation Army, and was a great friend of the Boy Scouts.

Mr. McClellan will be especially missed by his associates at the mill and in the Paper Industry.

Fred. S. Dreskell

Fred S. Dreskell for twelve years Manager of the Chicago office of the Champion Coated Paper Co., and since January 1, 1921, in charge of the Cleveland office for the same company, died at Gainesville, Fla., on April 6th.

Private burial was held from his home in Cleveland, O.

New Board Mill for Baltimore

It is reported that Baltimore, Md., will shortly have another important and much-needed industry added to its already long list. A group of well-known men, prominent in the paper industry, has organized a company for the manufacture of boxboard and will shortly erect a half-million-dollar plant on Gwynns Falls. The new company will be known as the Gwynns Falls Paper Company, and it is understood that its plant will be one of the most up to date in this country.

Plans for the plant are now in the hands of Joseph H. Wallace & Co., industrial engineers of New York, and it is expected that actual building operations will be under way by the middle of May.

It is said that the industries of Baltimore consume approximately 250,000 tons of boxboard annually and that only about 16 per cent. of this is manufactured in the State of Maryland.

The raw materials consisting of waste paper, which Baltimore can supply in abundance, will be taken to the plant daily in large motor trucks.

It is understood that from an engineering point, the site of the new plant is most advantageously located, having ample railroad facilities, good roads for trucks and above all an abundant supply of water.

The capitalization of the company, it is reported, will consist of $600,000 preferred stock and 18,000 shares of no par common.

Hall Settles Legal Actions with Paper Co.

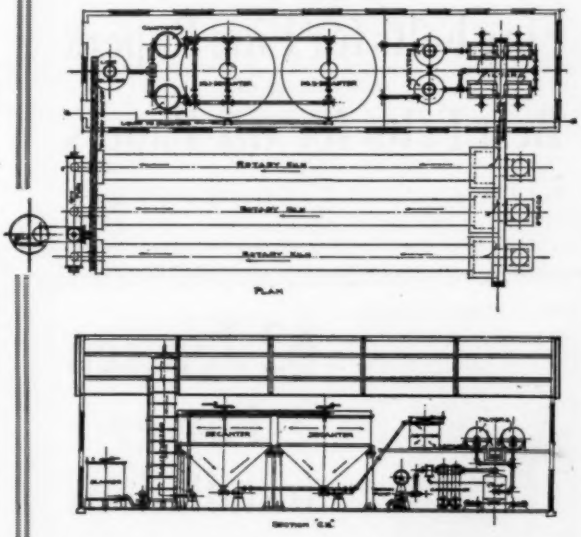
Three actions started in August, 1919, against Taggarts Paper Company, George C. Sherman and Taggarts Paper Company, and George C. Sherman, Taggarts Paper Company and Hall, Ward & Walker by Edward M. Hall, who was formerly associated with the defendants, have all been settled and discontinued.

No one is willing to say whether victory rests with the plaintiff or the defendants, and the papers filed do not show the details of the settlement.

Continuous Causticizing with Lime Recovery and Reuse

OUR apparatus is built for the specific purposes indicated in the above title. It is the work of our consulting engineer, who for nearly twenty-five years was general manager and chief designing engineer of one of the large alkali plants in this country. The apparatus has been in successful operation for some seven years, and is highly efficient, both as regards economy in the use of raw material, and saving in labor.

The complete plant which we furnish, consists, as indicated in the sketch, of a continuous causticizer, decanter, rotary filter, rotary kiln, gas producer, lime slaker and auxiliary apparatus such as vacuum pump, lime and liquor pumps and sludge agitator. All apparatus work continuously. The causticizer is heated with exhaust steam, and supplied continuously, by means of pumps, with calcium hydrate and sodium



carbonate in the proper proportions. The continuous discharge of caustic liquor and lime sludge is delivered by pumps to the decanters, the clear caustic drawn from the top and the mud from the bottom; delivered by pump direct to the sludge agitator from whence it flows to the filters. The dried filter cake is delivered by belt to rotary kilns fired with gas, from whence the recovered lime is returned to the slaker to be used again.

With good grade of lime, 90% of the sludge can be recovered. The alkali loss is with careful working, almost nil. All of the apparatus is of heavy construction, and specially designed for the work. The process being continuous the steam consumption is much less than that of the batch process, moreover the process does not require live steam, exhaust at 10 pounds pressure being ample to operate at maximum capacity.

Glamorgan Pipe & Foundry Co.

Lynchburg, Va., U. S. A.

W. H. FURBISH, Vice-Pres. J. L. MUNRO, Treas.

PAPER TRADING CO.

10 High St., Boston, Mass.

Paper Mill Supplies
Dryer Felts, Paper Stock

STANDARD BLEACHING POWDER

Manufactured by
Pennsylvania Salt M'f'g Co.
PHILADELPHIA, PA.

Lockport Felt Company
NEWFANE, NEW YORK
MAKERS OF
Fine Felts for Fine Papers
ALSO MAKERS OF
Best Felts for *all* Papers
SATISFACTION GUARANTEED

Fourdrinier Wires
WISCONSIN WIRE WORKS
ALL MESHES OF PAPER MAKING *Wire Cloth*
APPLETON WISCONSIN

JENSSEN ACID TOWERS
at Nekoosa Edwards Paper Co.
Port Edwards, Wisconsin

62 Jenssen Tower Installations
GREAT ECONOMY has been effected in mills where the
JENSSEN Two-Tower Acid Systems
have been installed
Sixty-two Installations now in operation or building
U. S. A., Canadian and European Patents
G. D. Jenssen Co.
200 Fifth Ave., New York

Appleton

Felts and Jackets
Manufactured By
APPLETON WOOLEN MILLS
APPLETON, WIS.

Cornell Reduction Co. Opens New Plant at Rumford, Me.

The Cornell Pulp Reduction Co., of Watertown, New York, is opening up a new plant at Rumford, Me., with an alleged output 100 per cent greater than at the old plant at Black River, New York.

The new plant, purchased some time ago by Paul B. Hudson, the treasurer, general manager and controlling factor of the company, is well outfitted, and provided with plenty of power for the operation of its machines.

The machinery has been removed and shipped from the Black River plant and is being set up under the direction of Superintendent George Murphy and David Carney, electrician for the concern, and Mr. Hudson has contracted for the screenings and waste material from the Oxford Paper company, manufacturers of a fine quality of super-calendered magazine paper made entirely from chemical pulp. His contract is for ten years and the supply will be about double that which he formerly received at the Black River plant. By his process the screenings and waste pulp are ground over into a very marketable commodity, especially desirable in the manufacture of leatherboard, trunkboard, paper washer board and similar papers.

The new plant is not only equipped with three machines for the reduction of the pulp screenings but with traveling cranes for moving the product and with a pipe line, which will bring the screenings directly from the mammoth plant of the Oxford Paper company underground to the beaters of the Cornell company.

New Men for Nuera Company

Mr. W. J. Blackley, Mr. C. Howard Blackley, Mr. George I. Walker and Mr. Ernest Bush have announced their resignation from the American Writing Paper Company, Holyoke, Mass. Mr. Walker and Mr. Bush left on March 15th, and Mr. W. J. Blackley and Mr. C. H. Blackley left April 1st.

These four men have gone with the Nuera Paper Company, Inc., Hadley, N. Y. Mr. W. J. Blackley is General Sales and Publicity manager, with Mr. C. H. Blackley as his assistant. Mr. Walker will look after the manufacturing end, with Mr. Bush as his assistant.

The Nuera Paper Company has at present two Fourdriniers and one cylinder machine. Foundation for a fourth machine is laid and part of the machine is ready. It has not been decided as yet whether to install a cylinder or Fourdrinier machine. The Company will manufacture colored specialties and plans later on to have two or three stock lines of cover papers.

Mr. D. J. Gauthier has succeeded F. W. Monaghan as superintendent of the Wausau Sulphate Fibre Co., Mosinee, Wis. This took effect on December 15, 1920.

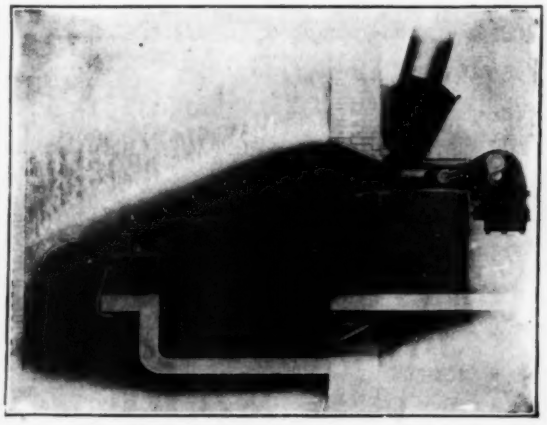
Mr. Monaghan is now connected with the Bagley and Sewall Co., of Watertown, N. Y.

New Firm of Manufacturing Engineers

Announcement is made of the formation of a new company known as O. S. Sleeper & Co., Buffalo, N. Y., organized for the purpose of placing on the market a line of drying and chemical apparatus of improved designs embodying special features which will be of great interest to users of this class of equipment. Its members recently resigned from the engineering staff of the Buffalo Foundry & Machine Company; Mr. Sleeper having been Chief Engineer of that concern for the past fourteen years.

Through experience gained in the manufacture and development of this type of equipment, they are prepared to furnish a line of Vacuum Shelf Dryers, Vacuum Rotary Dryers, Direct Heat Dryers, Flaking Machines, Crystallizers and special apparatus, properly designed and of a superior quality.

Let Riley Stokers Reduce Your Costs



Cross section through stoker showing automatic operation.

Riley Stokers are always on the job—you can rely on them to be at work every day. They are tireless—working all hours of the day and night—without complaint.

Paper Mills can cut their operating costs to a minimum by using Riley Underfeed Stokers. Consider the following facts:

RILEY UNDERFEED STOKERS

EFFICIENCY—Boiler tests on Riley Stokers have shown over-all efficiencies of 80% and higher.

LABOR-SAVING—One or two men can replace ten or twelve required for hand firing. Continuous, automatic discharge of ashes means elimination of drudgery in fire cleaning. Labor for ash handling in a well laid out plant is negligible.

CAPACITY—Capacities of 200% and more can be obtained over long periods which means fewer boilers with corresponding decrease in investment and maintenance.

COMPLETE COMBUSTION—The underfeed method and moving grates intimately mix the proper amount of air and coal, giving perfect combustion.

Catalog D-4 sent on request.

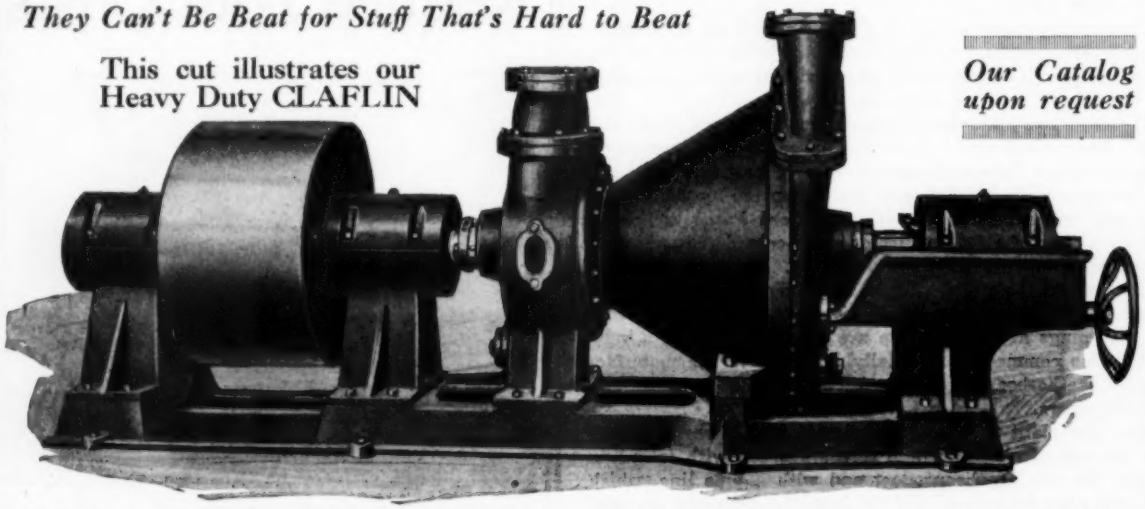
Sanford Riley Stoker Co.
Worcester, Mass.

Use Claflin Continuous Beaters

They Can't Be Beat for Stuff That's Hard to Beat

This cut illustrates our Heavy Duty CLAFLIN

Our Catalog upon request



Claflin Continuous Beaters will handle the hardest kind of stock direct from the cookers, and prepare it ready for the Paper Machine without any regular Beating Engines. Whether run in tandem or singly in connection with regular Beating Engines, they are gluttons in the amount of work they do.

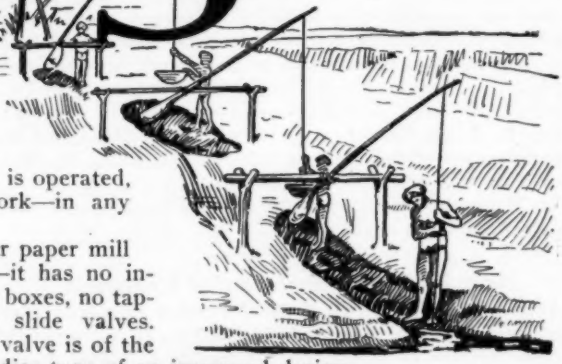
If you are not getting best results from your Sulphite Screenings or if some of this material is wasted, you ought to let us show you what can be done with an installation of CLAFLINS.

The Claflin Engineering Company, Lancaster, Ohio

Canadian Fairbanks-Morse Co., Ltd. **Montreal, Quebec** **Our Canadian Agents**

PUMPS

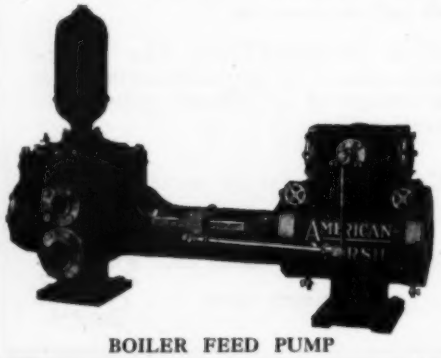
THE Egyptian Shadoof relays the water of the River Nile from one well to another until the heights above are reached.



Just as long as the dusky Egyptians continue to dip, dip, dip—to the tune of their monotonous "pumping" chant—the creaking Shadoof carries the water to the hills above. So long as an **American-Marsh** Pump is operated, it can be depended upon for splendidly efficient work—in any capacity desired.

The **American-Marsh** Pump is especially adapted for paper mill requirements—it has no internal stuffing boxes, no tappets and no slide valves. The auxiliary valve is of the semi-rotative disc type of an improved design.

Write for American-Marsh bulletins on pumps for paper mill service.



BOILER FEED PUMP

American Steam Pump Co.

Battle Creek, Mich.

Chicago Office
1220 Monadnock Block

New York Office
17 Battery Place

The American-Marsh lines also include Power Pumps, Air Compressors, Vacuum Pumps, Condensers, Deep Well Engines, Stock Pumps.

Vocational Education Booklet

Copies of the booklet "Vocational Education in the Pulp and Paper Industry," by J. C. Wright, which is the result of work which he did last summer in co-operation with the Vocational Education Committee of the Pulp and Paper Industry, are now being distributed. The pamphlet is being sent to educational authorities, mill managers, etc., throughout the United States for their assistance in planning actual installation of courses of instruction based upon the text books now in process of manufacture and of which the first volume has already been published. The Federal Board for Vocational Education is distributing 1,500 copies, 500 copies have been sent to the Canadian Pulp and Paper Association and 1,000 copies are being distributed among the mills in the United States.

Mr. Wright is assistant director for industrial education of the Federal Board of Vocational Education. He has made a survey of several different typical pulp and paper plants for the purpose of determining the specific vocational education matter which should be given. The survey was followed by an analysis of the principal jobs for the purpose of determining the specific character of the instruction which should be given for each group. The introduction consists of a splendid essay on "What Education Is" by Robert B. Wolf.

A careful study of this report and the application of its recommendations should result in the immediate starting of vocational education in the pulp and paper industry upon the best possible basis.

"Paper Making Materials"

Bibliographic Series Number 6 "Paper Making Materials" have been compiled and can now be had in book form. Copies may be obtained without charge by writing to Arthur D. Little, Inc., Cambridge, Mass. This bibliography has been compiled by Clarence J. West of the Information Department, Arthur D. Little, Inc., also Chairman of the Committee on Bibliography of the Technical Association of the Pulp and Paper Industry and was originally published as contribution number 23 of that committee.

The paper making materials have been listed in dictionary style under the common and Botanical names, the references being given only under the latter. A large number of woods commonly used in paper making are not listed. The list is composed largely of vegetable fibres other than wood, though a few of the last common varieties are included. In nearly all cases the references refer to actual experiments with or without success with the material and not a mere mention of the fact that the material might be suitable for paper making.

New Quarters for News Print Service Bureau

On April 25, 1921, the office of the News Print Service Bureau will be moved from 18 East 41st Street to Room 607 Canadian Pacific Building, 342 Madison Avenue, New York City, which is on Madison Avenue between 43d and 44th Streets, directly west of the Grand Central Station.

Correspondents and exchanges are asked to kindly change their mailing lists, so that the mail to arrive on April 25 or later will be sent to the new address.

Frank C. Overton, of Castle, Gottheil & Overton, importers of and dealers in papermakers' supplies at 200 Fifth avenue, New York, was elected president for the ensuing year of the National Association of Waste Material Dealers, Inc., at the annual meeting of that organization in the Hotel Astor, New York, on March 16. There was no opposition to Mr. Overton's candidacy and he was the unanimous choice to head the association for the next year. Mr. Overton has seen about thirty years in the paper stock trade and succeeded his father in the same line.

YALE

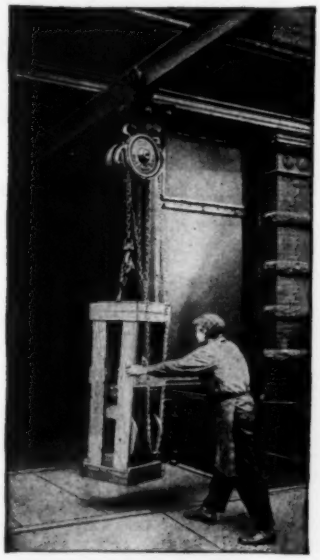
Muscle costs more than machines

MEN cost more than they did a generation ago because machines have increased their productive value.

Paying machine-production wages today to men who use only their muscle is the height of extravagance.

How do you handle the heavy materials in your plant? Do four or five men heave and tug at one task in the old-fashioned way, at a cost to you of from 40 cents to $1.25 per man per hour?

Or does one man do the job in half the time, with ease and the minimum of wear and tear, by using a Yale Spur-geared Block and Trolley?



Yale Spur-geared Block and Trolley

That's the way—the Yale way—in which that sort of job can be done safely and economically. Yale apparatus pays a substantial and steady return in saving time and the price of muscle.

Yale Spur-geared, Screw-geared and Differential Chain Blocks, Yale Electric Hoists, and Yale Electric Industrial Trucks are fully described in booklets which will be sent on request.

Yale Made is Yale Marked

The Yale & Towne Mfg. Co.

Stamford, Conn. U. S. A.

Yale Hoisting & Conveying Systems

Holyoke Machine Co. HOLYOKE MASS.

MAKERS OF

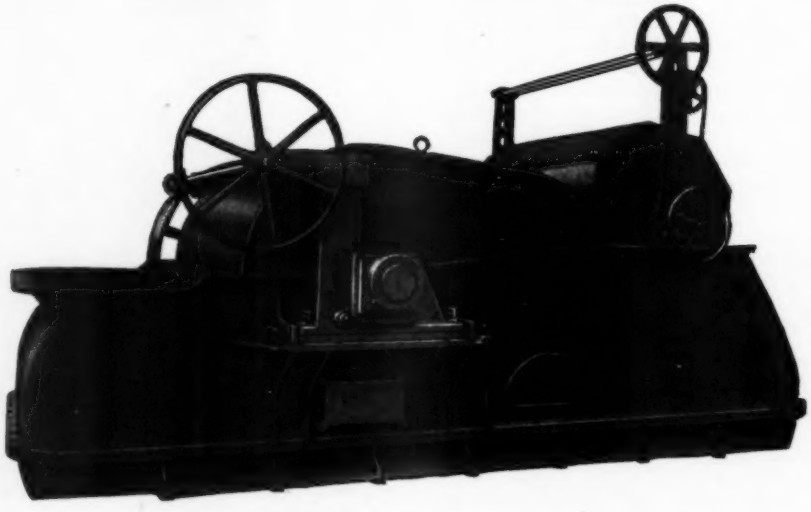
Improved Machinery for Wood Pulp, Paper Mills, Paper Converters, Printers and Lithographers

LARGEST MAKERS OF
CALENDERS
FOR FINISHING ALL KINDS OF PAPER *and* CARDBOARD

We Build Our Machinery to Meet YOUR Requirements

Cotton and Paper Rolls
with Patented Fastenings

Improved Type of Umpherston Beater



Information and Booklets describing our Specialties sent to you on request

Some of the "Holyoke" Specialties—Chilled Iron Rolls, Cotton Rolls, Paper Rolls, Wood Pulp Grinders, Wood Barkers, Wood Chippers, "Umpherston" Beaters, Rag and Paper Dusters, Washing and Beating Engines, Reeling Machines, Hydraulic Pumps, Hydraulic Presses, Coated Paper Strainers, Turbine Wheels, Gearing and Shafting, Calenders, Platers, Rag Cutters.

New Firm of Chemists and Engineers

Skinner, Sherman & Esselen, Inc. (Hervey J. Skinner, Herbert L. Sherman, Gustavus J. Esselen, Jr.) announce the organization of a firm of chemists and engineers. The new firm has acquired the business and good will of The Boston Bio-Chemical Laboratory and accordingly they are in a position to furnish counsel on all matters relating to the application of chemistry and biology to industrial operations.

Mr. Skinner is well known to the paper industry. For many years he was vice-president of Arthur D. Little, Inc., and in immediate charge of pulp and paper work. For the past two years he has maintained a consulting office in Boston.

Dr. Esselen is known to the cellulose industry as the secretary of the Cellulose Section of the American Chemical Society, and for his work on cellulose esters and cellulose acetate silk. The combination of Skinner and Esselen renders the new firm particularly qualified to be of assistance to the cellulose industries.

Mr. Sherman for many years was president of the New England Bureau of Tests and has extended experience in cement and other structural material problems.

The pulp and paper industry is to be congratulated on this new addition to the list of firms who are in a position to be of assistance to them in matters relating both to research and development.

The address of the new firm is 248 Boylston St., Boston, 17, Mass.

Pump Governor Bulletin

Having acquired sole rights to manufacture and sell Ideal Pump Governors, the Atlas Valve Company, 282 South street, Newark, N. J., are now distributing their first bulletin describing this excellent governor—Bulletin No. 1-A, Edition No. 1.

The bulletin is unusual in that it is complete. It shows photographs of finished pump governors, shows cross-sectional drawings with all parts numbered, installation and operation are fully explained, it gives dimensions and it also contains prices. The purchaser can therefore order directly from the bulletin without preliminary correspondence.

The Ideal Pump Governor is approved by the National Board of Supervising Inspectors of Steam Vessels, and it is also approved by the Bureau of Engineering, United States Navy Department. Two pages of the bulletin are devoted to special types of Ideal Governors for accumulators, for high pressure fire hydrant service to reduce the main pressure to a safe carrying hose pressure, for hydraulic pumping rams, and for pumps for low pressure salt or fresh water, acids, oil, ammonia, gas, or air line service. A copy of the bulletin will be mailed to any reader of this publication upon request.

The J. O. Ross Engineering Corporation has recently been organized and incorporated under New York State laws, with headquarters at 30 East Forty-second street, New York City, and branches in Boston, Chicago and Rochester. The company will design, manufacture and install vapor absorption systems, formerly known as the Sturtevant vapor absorption system, and installed by the B. F. Sturtevant Company, the J. O. Ross Engineering Corporation taking over all this work from the Sturtevant Company. John O. Ross, president and general manager of the new corporation, was until the first of this year manager of the drying department of the B. F. Sturtevant Company.

The Standard Supply and Equipment Company, of 71 Murray street, New York City, has taken over the agency in the New York district for the Reeves Variable Speed Transmission and the Reeves Wood Split Pulley, which was formerly held by Patterson, Gottfried & Hunter, Inc. W. L. Garcia, formerly at the head of the power transmission department of the latter firm, will continue in his relationship with the Reeves line in the Standard Supply and Equipment Company.

CASEIN

Standard Quality
Lowest Prices

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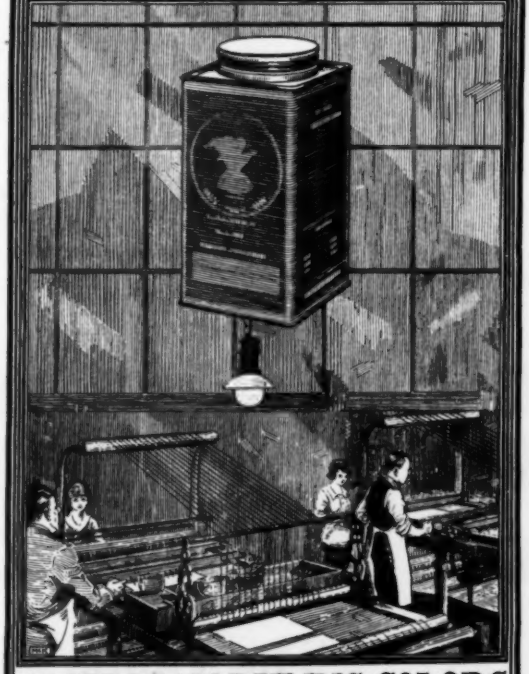
ARE MOVING TO
NEW WAREHOUSE

593-599 Atlantic Avenue, Boston

SUPERIOR SERVICE ON
Paper, Envelopes, Cardboard
Folders and Announcements

THE STORY OF JEFSON



AMERICAN RULING COLORS

Write for this unusual ruled booklet J. E. FOSTER & SON, Portland, Me.

UNION

PIONEERS

The Union Sulphur Company are the pioneers of the sulphur industry of America and today, after nearly 20 years of constantly increasing business, are still the leaders.

PURITY

The sulphur produced by this company runs well over the 99% purity guaranteed. Tests show that Union sulphur has maintatined a purity that is unsurpassed and, when you contract for Union sulphur, you are sure of obtaining more than their guarantee.

SERVICE

The better to serve the paper manufacturers, a fleet of vessels used solely to transport sulphur to numerous ports for distribution is owned and operated by this company bringing to you the highest grade brimstone at the lowest possible cost.

RESERVE

Ample reserve stocks are always carried so that no matter how large your order it can be shipped without delay. Warehouses in convenient centers are provided with generous supplies to take care of emergencies.

PAPER—PULP

High grade pulp requires two ingredients—carefully selected wood and pure sulphur. Whatever the wood you use, be sure to combine with it the right sulphur—Union Sulphur.

SULPHUR

The Union Sulphur Company

17 Battery Place, New York

Maine Pulp Mill Enlarged

The new digester house addition for the Penobscot Chemical Fibre Company, Great Works, Me., has been completed and turned over to the owners by the Aberthaw Construction Company of Boston, the builders. Although this addition is designed to house two new digesters, only one installation will be made at present.

Gain in International Paper Co. Earnings

The annual statement of the International Paper Company for the year ended December 31, 1920, shows net income, after charges and federal tax, of $11,836,362. This was equivalent, after preferred dividends, to $52.07 a share earned on $19,850,264 of common stock and compares with $13.24 a share earned on $19,803,902 of common in the previous year. Surplus for the year was $21,726,259, against $19,104,763 in 1919.

The water filtration system for the new Kimberly-Clark Paper Mill at Niagara Falls was manufactured and erected by Hungerford & Terry, Inc., of Philadelphia. This plant consists of four units built of concrete with a capacity of one million gallons each.

Victor T. Goggin, late New England Sales Manager of Fred T. Ley & Co., Inc., of Springfield, Boston and New York, has servered his connection with that concern to associate himself as Contracting Engineer with Dwight P. Robinson & Company, Inc., of New York, Chicago, Dallas, Youngstown, Los Angeles and Montreal.

The Union Paper Products Co., of New Orleans, La., incorporated last June, opened its new plant early last month. It is said to be valued at almost a quarter of a million dollars, and the last word in industrial architecture and equipment. The company will specialize in the manufacture of corrugated paper and fiber boxes.

Byers Machine Co. Changes Name

The firm name of The John F. Byers Machine Co., Ravenna, Ohio, has been officially changed to The Ryers Machine Co., and will so appear henceforth.

The Byers Machine Co. are the manufacturers of the "Auto-Crane" and full revolving cranes, being especially adapted for paper mill service.

Superheater Co. Changes Name

Announcement is made that effective March 1st, 1921, the name of Locomotive Superheater Company has been changed to The Superheater Company. This change has been considered advisable in view of the activity of our organization in the development of superheater equipment for marine industrial and contracting requirements.

"National Erie Fast Orange A" is the latest addition to the series of direct dyes produced by the National Aniline & Chemical Co., Inc. It is recommended for paper straining and for jute, straw and chip dyeing.

D. C. Everest, secretary and general manager of the Marathon Paper Mills Co., Rothschild, Wis., has been elected a director of the Wisconsin Forestry and Development Company organized at Milwaukee recently.

The second machine installed at the Oregon Pulp and Paper Co., Salem, Ore., is now running. The machine makes lightweight papers, such as fruit wrappers and tissue specialties. It turns out seven tons a day.

Fire damaged the Pennsylvania Paper Stock Company's building in Pittsburgh recently to the extent of $100,000 loss.

Box Boards

Paper Board Specialties

The field in which LaBoiteaux is leader—you are assured

—quality
—service
—satisfaction

Our four branches are ever ready to serve you, and our organization is prepared to give quick attention to your requirements.

The C. L. LaBoiteaux Co.

CINCINNATI CLEVELAND
CHICAGO NEW YORK

HAMMERMILL BOND
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HAMMERMILL LEDGER
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The Standard Utility Business Papers and the Most Widely Used Papers in the World

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OF

PAPER—CARDBOARD—BOXBOARD

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Paper Makers' Supplies

Flax Waste	Linen Thread Waste
Italian Hemp Waste	Linen Cuttings
Flax Spinners Waste	Jute Waste

Samples and Quotations on Request

We recommend equipment to fit your conditions and do not try to make your conditions fit the equipment

SHAW SYSTEM

FOR BETTER OPERATION OF STEAM BOILERS

Grate Bars Steam Traps

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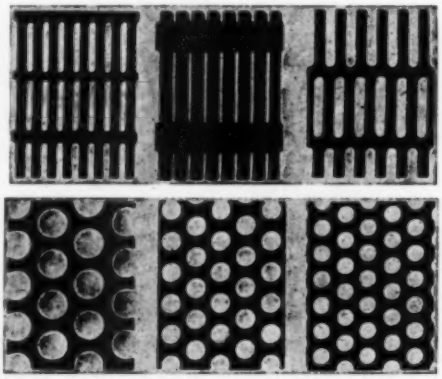
DETROIT GRAND RAPIDS INDIANAPOLIS TOLEDO

Perforated Metal Screens



Of Copper, Brass, Steel, Bronze, or Any Other Metal

Perforations of All Sizes and Shapes for Use in Pulp and Paper Mills in

Centrifugal Screens, Drainer-Bottoms, Filter Plates, Pulp Washers, Suction Box Covers, Etc.

Accuracy in all details and excellence of quality at lowest consistent prices

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Of Exceptional Quality to Meet Every Requirement

We are tank specialists, producing scientifically made tanks that are guaranteed satisfactory in every case.

We are equipped to furnish tanks of any size for any purpose.

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103 Park Avenue

The HAUSER-STANDER TANK Co.
CINCINNATI, O U.S.A.

Electric Light Costs

(Reprint of a contribution by Charles Clark, Chief Electrician of the Detroit Sulphite Pulp and Paper Co., to their monthly Bulletin.)

DID YOU ever stop to consider the amount of money expended for the renewal of electric light globes in this plant? The cost of this replacement each month runs high.

For the month of January a total of 410 globes were used, which at 36 cents each, amounts to $147.60. In December, only 363 lamps were used, showing an increase in January of 47 lamps, when there should have been a decrease, as we have more daylight in the month of January than we do in December.

A short time ago our records showed that an excessive number of lamps were going to No. 6 beater room, and upon investigating this, it was found that these lamps were used in No. 3 dumping chest. The reason why so many lamps were required was that when the stock in the chest was low, the lamps would be lowered into the chest, and when the chest filled up, the lamps were submerged, and the wax between the base of the lamp and the glass would become softened, the glass would work loose from the base and the lamps were then of no use.

A little thought and care on our part would reduce greatly the number of broken and missing lamps. We know that we can not reduce the number of burned-out lamps, but when you consider that of the 410 lamps used in the month of January, that 112 of them were either broken or missing, you can see that we can still make a big saving on electric light globes.

Electric light lamps are made of a very fine wire, which is very sensitive to shocks, so treat them gently. After looking at the condition of the stock in the chests, do not leave the lamps down in the chest—raise them up, so that when you wish to use them again, they are in good condition; should you break a lamp, do not take another lamp from some outlet and use it, as when this lamp is replaced, and there is no old lamp or base there, it goes on the record as missing. Lamps are of different sizes and build, and so if you take a lamp from some other outlet and use it, that lamp may not be for the same use, the result being that we have another broken lamp on the records.

As stated above, a little thought and care on the part of each one of us, will materially reduce the number of broken and missing lamps. If lamps burn out, notify the electrician at once, and he will see that the lamps are taken care of and that you get immediate service.

Many accidents are caused by fooling, horseplay, and detracting the attention of others says the National Safety Council.

The New Stickle Feed Water Heater and Purifier

The reason we changed the construction of our heater from cast iron shell to a steel shell was to meet the demand of consulting engineers who specify an open heater to carry from 10 to 15 pounds back pressure. This is particularly necessary in Paper Mills for drying the sheet with exhaust steam. When you put this pressure on a cast iron heater built up of rectangular flat plates you have gone far beyond the limit of safety. That is the reason we use a heavy steel shell. The same principles of heating and purification are carried our as in our old heater.

Open Coil Heater & Purifier Company

Indianapolis, Indiana

Boston **Philadelphia**

Perforated Metal Screens

in all metals for pulp and paper mills

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Mac Sim Bar Paper Company
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"MAC SIM BAR" MEANS "BEST"

We Carry in Stock JUTE BOARD, PLAIN, OAK GRAINED AND MARBLED GRAINED, IN SIZE 26x38, REGULARS 40, 50, 60 AND 70 FOR THE WHOLESALE TRADE

DANA T. McIVER

HIGH GRADE PRINTING PAPER

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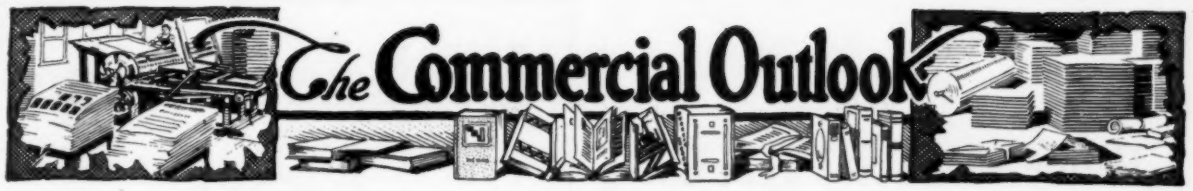
CHICAGO

BOOK AND COATED PAPER

CAR LOT AND TONNAGE CONTRACTS



ALTHOUGH trade activity in paper of practically all kinds is still far below normal proportions, every indication at present in view would seem to point to the industry having experienced the worst, and that from now on business is due for a revival. Consumers are as yet buying strictly in hand to mouth fashion, and paper manufacturers the country over are not obtaining sufficient orders to warrant the operation of their mills at anything approaching full capacity, with the result that production is at an exceptionally low level. Signs are not wanting, however, that the long-awaited turn in the market has come. Buyers are evincing increased interest, not because they feel that now is the time to lay in stocks of paper, but because their growing requirements, caused by expanding activity in their own lines, are obliging them to give more attention to necessary paper supplies.

That the revival of the market will be a slow and rather long drawn-out process goes without saying. It must be remembered that the business conditions existing during the past half year or longer have greatly unsettled sentiment in the commercial world, and it will require time for consumers and producers alike to regain confidence in the stability of commodity prices. Moreover, the prevailing financial situation in itself is sufficient to hold buying very materially in check. The money losses of the past few months have placed a majority of concerns—large and small and in all parts of the country—in a position where they necessarily will have to proceed toward building up their business again in a cautious way. Manufacturers, consumers and middlemen have learned a sad lesson in connection with holding large stocks of merchandise since the war, and there is little doubt that buying for at least a period of a year or so will be confined almost solely to cover direct needs.

This is something for which paper manufacturers can be truly thankful, because they can feel assured that when demand does broaden, the increased trade activity will be healthy. There is no denying that paper consumers are largely responsible for the conditions prevailing in recent months. During the period of false or inflated prosperity following the war, when users of paper were literally falling over each other to secure supplies, they created the impression among manufacturers that consumption of paper had increased to a point justifying the voluminous demand. As it has been since found out, much of the paper bought at that time by publishers, printers and other consumers was stored away so as to insure the purchasers an ample supply, come what may, and when the period of readjustment came these surplus stocks served to greatly disrupt the market and to depress prices.

Present indications are that the bulk of surplus stocks of paper of all kinds are very nearly liquidated. Jobbers, the country over, are known to have abnormally small amounts of paper on their store shelves and in their warehouses. Publishers and printers have refrained from buying while concentrating their attention on reducing their holdings to a minimum. Retailers have gradually disposed of stocks until they have little or nothing in the form of sizable amounts of paper on hand. It is therefore self-evident that just as soon as activity in the various paper-consuming trades pick up, making for the need of larger quantities of paper, manufacturers will at once feel the effect through a broader demand upon them for supplies. Paper mills are acknowledged to have comparatively heavy stocks of their product, because they hesitated to curtail production until certain that demand really had subsided and also because they desired to run out holdings of raw material acquired at high costs, and yet it is generally conceded that were jobbers to resume buying in normal volume that present mill stocks of paper would not serve to fill the demand for longer than a month and a half.

Improvement is noted in the fine paper market, in some branches of the coarse paper market and in certain paper specialties. Consumers are centering their buying of writing papers on the low-priced lines, nevertheless they are absorbing larger amounts than in some time. Wrapping paper, kraft especially, is enjoying increased market activity; cover papers of some descriptions are moving better, and a decided quickening of demand for folding box boards is noted.

The news print market remains quiet. Publishers have their current wants filled almost entirely by contract deliveries and are seldom appearing as buyers in the open market. The fact that surplus stocks of news print have been thrown on the market and that fairly large amounts have been imported from Germany and Scandinavia has unsettled matters and made for weakness in prices. The International Paper Company has fixed a flat rate of 5.50 cents per pound to contract customers for news print in standard rolls for second quarter delivery, and some manufacturers are booking orders at 5 cents, and probably for less in out of the way cases. Spot prices on news print are very easy. Around 5 cents is the average quotation but some distress lots have sold far under this figure.

Book papers have sagged further in price. Machine finished book is quoted at an average of 9 cents at mills, while supercalendered book is available at around 11 cents and coated book at 13 cents. Tissues have dropped sharply in price to a basis of about $1 per ream for No. 1 white tissue paper, while domestic No. 1 kraft wrapping is down to between 7 and 8 cents per pound.

Plain chip board is quoted by eastern mills at $30 per ton, and in some cases at even lower prices, while news board is readily available at $40 for solid and $35 for filled board.

American Ex-Soldiers in Canada

To Americans who have participated in the Great War and who are at present employed in the Canadian Paper Mills: their attention is called to the fact, that the American Legion have now opened Club Quarters in Montreal. Those who have served in the Great War are requested to join this organization and help to promote good fellowship in Canada and also, to help Ex-American Veterans, to claim their dues.

The Club rooms in Montreal are very conveniently located and opened expressly for the purpose of receiving strangers coming into Montreal requiring information and other assistance.

It's up to the American Ex-Soldiers to make the American Legion in Canada a success, and it is hoped that application for membership will be made.

For full information pertaining to this subject, please address Mr. H. A. Bouffard, of Bouffard-Bergevin, New Birks, Montreal.

The
Hinde & Dauch Paper Co.

Corrugated
Fibre Shipping Boxes
and Packing Materials of
Acknowledged Superiority

Sales offices in principal cities

MAIN OFFICE
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Leshner Blues

UNITED STATES LPSCo LARGEST RAG PACKERS

Highest Percentage
Dressed Rag

We assure absolute
maximum yield

The LESHNER PAPER STOCK CO.
[INCORPORATED]
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Raw and Bleached

UNIFORM SHIPMENTS

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Paper Stock

Relieving
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of Raw Materials

Out of the forty different kinds of paper stock graded in our many large warehouses, you are assured a steady, reliable source for procuring raw materials in practically every branch of paper making.

Having specialized for 35 years in this one field you can depend upon a clean, well-packed, uniform product throughout; fulfillment of delivery promises; and because of our output of 300 tons daily, big tonnage at all times.

Write us your wants and we'll gladly send further information.

Mendelson Bros. Paper Stock Co.
910 South Michigan Avenue, Chicago, Ill.
Long Distance Phones: Harrison 2840 and 5557.

Papermaking Rags

This is the season when the papermaking rag market invariably is on the down trend, and the recession in prices is accentuated more than usually this year by the general dearth of important demand from consuming quarters. With paper manufacturers as a rule operating their plants on a curtailed schedule, they are obviously using less raw material than ordinarily, and with most of them still rather uncertain as to what the future will bring in the way of business in their own product, few are willing to anticipate forward requirements of raw stock. The influence of both these factors is to keep buyers of rags out of evidence, and such business as is current consists almost entirely of small quantities of rags directly needed by paper mills.

Veteran members of the rag trade assert that never in their recollection have they witnessed such a prolonged period of light buying as they have experienced during the past few months and are still experiencing. Papermakers realize that it is during the spring of the year when the movement of rags from collection centers is the heaviest, thus making for easiness in values, and are consequently confining their present purchasing to rags immediately required. Business is very spotty and only spasmodically are orders involving sizable amounts of rags received by dealers and packers. Stocks, of course, are piling up in graders' and dealers' establishments, and the heavier stocks become, the lower prices go in the face of packers' arguments, that prevailing high labor costs make it almost impossible for them to realize a profit in operations at ruling prices.

One thing seems certain; paper mills are not likely to have trouble in securing all the rag stock needed during the next few months. A flurry of buying might send prices up somewhat, but there appears little probability of any sharp rise in rag values because of the large stocks resulting from the slow movement into consuming channels for the last half year. At the same time, it is hardly to be expected that prices will decline to levels existing before the war for the reason that rags cannot be profitably collected, sorted and packed at the same costs. Prices prevailing today are on an average, roughly estimating, from 30 to 40 per cent above pre-war ranges, and it is quite likely that further recession, for at least the near future, will be of narrow scope.

New cuttings of most descriptions are quotably lower, and there has been a considerable drop in prices on old whites. Roofing holds fairly steady, partly because prices on satinets are nearer to the old levels than other grades and also because felt manufacturers are purchasing in relatively larger volume than other paper mills.

F. o. b. shipping point quotations follow:

New Stock—	New York and Chicago
White shirt cuttings, No. 1	12.00-12.50
White shirt cuttings, No. 2	7.50- 8.50
Fancy shirt cuttings	7.50- 8.00
Washables, No. 1	5.75- 6.00
Unbleached muslins	11.00-11.50
White lawns	11.50-12.00
Overall cuttings, blue	8.00- 8.50
Black silesias	4.25- 4.50
Old Stock—	
Whites, No. 1 repacked	6.25- 6.75
Whites, No. 2 repacked	4.00- 4.25
Whites, house soiled	2.25- 2.50
Whites, street soiled	1.75- 2.00
Thirds and blues, repacked	2.50- 3.00
Thirds and blues, rough	1.75- 2.00
Black stockings	2.50- 2.75
Lace curtains	5.50- 6.00
Cotton canvas, No. 1	4.00- 4.25
White cotton batting	2.00- 2.25
Roofing, No. 1	.90- 1.00
Roofing, No. 2	.80- .90

Rope and Bagging

Although paper mills are absorbing old rope in fairly steady fashion in comparison with their buying of other kinds of raw material, the best proof that the volume of demand is limited is gained from the light importations of this product. It is an undisputed fact that the United States does not produce sufficient old rope to fill the needs of consuming plants when they are running at normal capacity, with the result that sizable amounts of old rope are imported from European countries. Recently imports have fallen away to negligible lots, thus indicating that the domestic supply is ample to cover consumers' wants. There are, however, some mills placing orders for rope in a steady way though they are buying mainly in small amounts. Quotations on old Manila rope in No. 1 condition range around 4 cents per pound at shipping points. There have been purchases at 3.75 cents, while on the other hand, 4.25 cents has also been reported paid.

Old bagging is in a lifeless market position. Few mills are interested in offerings, and aside from an occasional transaction involving a small parcel of material, practically no business is current. Prices on nearly all grades of old burlap and gunny bagging are lower. Quotations f. o. b. shipping points are:

	New York and Chicago
Gunny, No. 1 domestic	1.40-1.60
Gunny, No. 1 foreign	1.25-1.50
Scrap bagging, No. 1	1.00-1.25
Roofing bagging	.65- .75
Wool tares, heavy	1.75-2.00
Wool tares, light	1.50-1.75
Manila rope, No. 1 foreign	3.75-4.00
Manila rope, No. 1 domestic	3.75-4.25
Sisal strings	2.00-2.25
Mixed strings	1.00-1.25

Old Papers

Pronounced dullness prevails in the old paper market. Consuming plants are buying in sparse amounts, not because of any question of price but because they are not using waste paper in usual quantity while running at reduced schedule. Waste paper is a commodity that seldom is purchased by consumers in other than hand-to-mouth fashion for the reason that it requires a great amount of warehouse room to store any sizable tonnage. There seems little doubt that a good many paper and board manufacturers would lay in a heavy supply of waste paper at the attractive prices ruling on most grades at present if they had the facilities for storing the material, because it is readily conceded that old paper of a majority of descriptions is today available at about as cheap prices as it can possibly be. But waste paper necessarily must

E. J. KELLER COMPANY

INCORPORATED

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FOREIGN AND DOMESTIC

PAPER MAKERS' SUPPLIES

CHEMICAL AND MECHANICAL PULPS

COTTON, JUTE AND FLAX WASTES

EAST INDIA MERCHANDISE

ESTABLISHED 1895

Daniel M. Hicks

Incorporated

FOREIGN AND DOMESTIC

Rags, Bagging, Rope and Waste Paper

PULPS, CHEMICALS, COLORS, WIRES, FELTS
CLAY, CASEIN, ETC.

Importers DANIEL M. HICKS *Dealers*

200 FIFTH AVENUE INCORPORATED *ESTABLISHED 1895* NEW YORK CITY

be housed to protect it from the weather, and the average consuming mill has storage room for only a limited tonnage, which doubtless most mills have filled, and current buying is merely to cover direct requirements.

Folded newspapers are down in price to 45 cents per 100 pounds and No. 1 mixed papers to 35 cents, which prices are about the levels at which these grades normally sell for. Old books and magazines are available at 1.00 to 1.15 cents per pound at shipping points, old No. 1 kraft at 1.60 cents, white blank news cuttings at 1.65 cents and ledger stock at 2 cents. Shavings have continued to decline and are freely offered by dealers at 3.25 to 3.50 cents for No. 1 hard white and 2.25 to 2.50 cents for No. 1 soft white without attracting many buyers. Prices throughout the list are very soft and their only salvation appears to be an appreciable increase in demand. Quotations f. o. b. shipping points follow:

	New York and Chicago
Hard white shavings, No. 1	3.25-3.50
Hard white shavings, Nos. 2-3	2.25-2.50
Soft white shavings	2.25-2.50
Colored shavings	1.25-1.50
Heavy book, No. 1	1.00-1.15
Crumpled No. 1	.80- .90
Ledger stock	2.00-2.25
Kraft, No. 1	1.60-1.75
Manilas, No. 1	.90-1.00
White blank news	1.65-1.75
Overissue news, No. 1	.60- .65
Folded news	.45- .50
Mill wrappers	.60- .70
Box board cuttings	.45- .50
Mixed paper, No. 1	.35- .40
Common paper	.25- .30

Chemical Pulp

There has been a little livelier inquiry for chemical wood pulp, but actual business has broadened but slightly, if any. The steady sinking of prices naturally is creative of increased interest among consumers and yet very few of them have expanded their buying to any material extent, and present trade activity involves almost exclusively pulp required by paper mills for immediate use. The prevailing dullness of the market is due to several causes. The chief one is that paper and board manufacturers are in need of but little pulp in addition to the supply coming in on contract, because they are operating at greatly reduced capacity. It is also a consensus of opinion among papermakers that wood pulp prices will go even lower than now prevail, and this prompts most buyers to refrain from anticipating requirements. Another depressing factor is the belief common among paper manufacturers that large lots of pulp will be shipped to the United States from Sweden and Finland during the next few months, with some expecting fairly heavy supplies from Germany. The average consumer of chemical pulp therefore is at present entering the market as a buyer only when pressed by necessity, with the result that demand is exceedingly limited and the aggregate movement of supplies toward paper mills is far below normal tonnage.

Pulp manufacturers, along with papermakers, have in a majority of cases cut down their production during the period of business depression. Notwithstanding, available stocks of pulp appear excessive, at any rate in relation to the prevailing demand, and the proverbial law of supply and demand is effecting a lowering of pulp values. Bleached sulphite is quoted by several of the largest producers at 6.50 cents per pound, but it is questionable whether buyers can be induced to pay this figure and sales have been recorded at substantially lower levels. News grade sulphite is freely offered at 3.50 cents a pound at pulp mills, with most of the business actually transpiring done at 3 cents or but a shade higher. Domestic

Pure Drinking Water
Keeps Workmen Healthy

Physiologists agree that in order to keep the body in a normal state of health, a man should drink the equivalent of not less than seven glasses of water each day. Pure drinking water is a primary requisite for hygienic living and helps to keep the body free from all intestinal disturbances.

Stimulate the efforts of your employes and save their time in going to inaccessible hydrants by piping clear, cold water to them by means of Milwaukee's

"Famous" Cooler Fountains

This fountain includes a barrel of 1⅝" thick oak, painted outside; cover of double thickness; galvanized pipe coil through which water passes to drinking head without coming in contact with ice, and a heavy vitreous china bowl with either cast brass bubbling head with self-closing stop or "Vertico-Slant" stream from which glass can be readily filled.

RUNDLE-SPENCE MFG. COMPANY
MILWAUKEE *Write for Catalog* WISCONSIN

335,000,000 Cubic Feet National Forest Timber and Pulpwood for Sale

LOCATION AND AMOUNT—All the merchantable dead timber standing or down, and all the live timber marked or designated for cutting on an area embracing about 150,000 acres on the west side of Admiralty Island, extending from Young Bay on the northeast side of the island across to the head of Hawk Inlet, and thence southerly along the west side of the island to Kootsnahoo Inlet and Mitchell Bay, Tongass National Forest, Alaska, estimated to be 335,000,000 cubic feet, approximately equivalent to 3,350,000 cords, more or less, of Sitka spruce, hemlock and other species of timber, approximately 85 per cent hemlock.

STUMPAGE PRICES—Lowest rates considered, $.60 per 100 cubic feet for Sitka spruce and Alaska cedar and $.30 per 100 cubic feet for hemlock and other species. Rates to be readjusted every five years.

DEPOSIT—With bid $10,000, to be applied on the purchase price, refunded, or retained in part as liquidated damages, according to the conditions of sale.

FINAL DATE FOR BIDS—Sealed bids will be received by the District Forester, Portland, Oregon, up to and including June 30, 1921.
The right to reject any and all bids is reserved.
Before bids are submitted full information concerning the character of the timber, conditions of sale, deposits, and the submission of bids should be obtained from the District Forester, Portland, Oregon, or the District Forester, Ketchikan, Alaska.

DIAMOND ALKALI COMPANY

MANUFACTURERS OF

Soda Ash 58%

Modified Sodas

ALKALI

Caustic Soda 76%

Special Alkalies

BICARBONATE OF SODA, U. S. P.

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Contains 99+%
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CAUSTIC SODA 76%
Contains 97+%
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Crown Filler for Paper Manufacture

MANUFACTURED BY

THE SOLVAY PROCESS CO.

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SELLING AGENTS

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89 State Street, BOSTON 625 Book Building, DETROIT

kraft is selling at 3.50 cents for the No. 1 grade, while southern kraft pulp has been bought at as low as 2.75 cents. Refined sulphite screenings have sold at one cent per pound, and soda pulp is available at 5.75 to 6 cents.

Quotations f. o. b. pulp mills follow:

Bleached sulphite	5.50-6.00
Easy bleaching sulphite	4.50-4.75
Unbleached sulphite No. 1	4.00-4.25
News grade sulphite	3.00-3.50
Soda pulp, bleached	5.75-6.00
Mitscherlich unbleached	4.75-5.00
Kraft No. 1	3.50-3.75
Screenings, refined	1.00-1.25

Mechanical Pulp

The market for mechanical wood pulp is in a quiet and easy condition. Paper manufacturers are doing very little buying, and were it not for contract business, the movement of pulp into consuming channels would be close to a standstill. Prices have steadily eased off until about $35 per ton, f. o. b. grinding plants, constitutes the market value of prime spruce ground wood, with reports heard of some purchases at even less than this figure. As prices creep nearer to the level considered the normal average prior to the war, the decline becomes more orderly and of slower momentum, yet the fact remains that the market is gradually touching weaker levels under a situation where production unquestionably is greater than consumption. There are those in the trade who expect ground wood prices to sink to about $30 a ton and to hold at around that basis, with some expressing the opinion that regardless of the low points which the market might reach during the next few weeks a sharp recovery will take place before the summer is well on the way. There are so many factors governing the ground wood market, such as weather conditions, droughts, delay in wood deliveries, etc., that it is difficult to figure what the market might do during the next few months.

Newsprint and board manufacturers are keeping almost entirely out of sight as buyers, which accounts for the dull market. These consumers have present requirements covered by contract deliveries of pulp and are seldom purchasing in the open market. Other buyers come into view only at spasmodic intervals and even then are absorbing but small amounts of pulp.

Chemicals

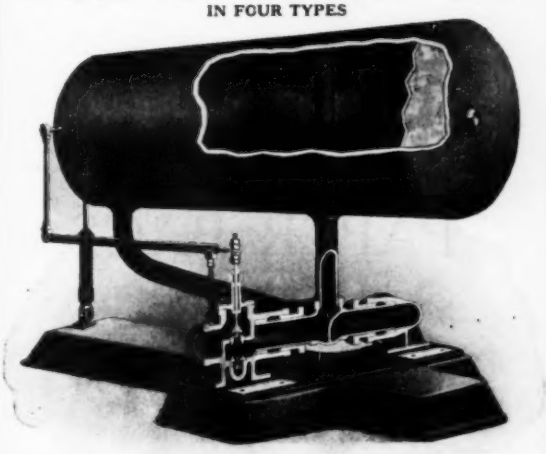
The outstanding feature in the papermakers' chemicals market has been a sharp decline in bleaching powder prices. Due to heavy importations of this product, which have been offered at prices considerably under domestic producers' quotations, manufacturers have been obliged to reduce prices to around 2.75 cents per pound f. o. b. works for bleach in domestic drums, and the probabilities are buyers can obtain some supply at under this figure.

Other chemicals are gradually moving downward in price in most instances under a pronounced lack of important demand. Contract business is passing as usual, but the spot trade is almost entirely devoid of activity. Quotations range as follows:

Alum, lump ammonia	4.25- 4.50
Alum, lump starch	7.50- 8.00
Alum, powdered	5.00- 5.50
Blanc fixe, powdered	3.75- 4.00
Bleaching powder (domestic drums)	2.75- 3.00
Brimstone (ton)	15.00-16.00
Casein	12.50-14.50
Caustic soda, spot delivery	3.50- 3.75
China clay, domestic, washed	9.00-10.00
China clay, foreign	14.00-16.00

The ELLIS AUTOMATIC TILTING STEAM TRAP

IN FOUR TYPES



Vacuum Traps, Direct Return Traps
Lifting Traps, Separating Traps

ESPECIALLY ADAPTED FOR PAPER MILL USES

The best trap made to remove the steam condensation from paper machine dryers. Works on a new and improved principle different from any other trap on the market.

Let us send you further information

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PAPER BAGS

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NEWS PRINT

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Newport Azo Eosine G

which is a very bright acid pink. It is faster to light and is more economical than basic eosine. We will be pleased to supply further information.

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Branch Sales Offices
Boston, Philadelphia, Greensboro, N. C., Chicago
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Vulcan TRADE MARK

THE next time you are buying any kind of a cotton dryer felt, fourdrinier or cylinder wire, enamel or rubber apron cloth, felt washing powder, cotton tapes for cutters, etc., cotton or rubber belting, or any other requirement of a paper mill, get in touch with

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BOSTON MASS.

Our services are at your disposal at all times, and all inquiries will be attended to in our most scrupulous and conscientious manner.

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FOR THE MANUFACTURE OF

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We manufacture a type of machine which is being used successfully by

Liberty Paper Company, Bellows Falls, Vt.
Standard Paper Company, Bellows Falls, Vt.
Central Paper Company, Menasha, Wisconsin.
Gummed Papers, Ltd., Brompton, Ontario.
Holyoke Card & Paper Co., Springfield, Mass.
American Re-enforced Paper Co., Attleboro, Mass.
Also in Japan.

Frank H. Davis Co., Cambridge, 40, Mass.
175 Richdale Ave.

Rosin, grade E	6.25-
Satin white	2.25- 2.50
Soda ash, 58 per cent light (bags)	2.00- 2.25
Sulphite of alumina, commercial grade	2.25- 2.50
Starch, papermakers', in bags	3.43-
Talc (ton)	16.00-18.00

Foreign Trade Opportunities

The purchase is desired by a manufacturing firm in New Zealand of wood products machinery, wood pulp, and a wood-preservative plant. Quotations should be given c. i. f. New Zealand port. Reference. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 34567.

An importing firm in Spain desires to purchase and secure an agency for the sale of paper pulp, chemicals, etc. Correspondence should be in French or Sapnish. Reference. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 34556.

A merchant in Canada desires to secure an agency for the sale of stationery and stationers' supplies. Quotations should be given c. i. f. Canadian port or f. o. b. factory. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 34578.

A company of manufacturers and importers in India desires to be placed in connection with firms for the importation of paper, printers' supplies and other articles. References. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 34542.

A firm of stationery merchants in Canada desires to purchase adding-machine paper. Quotations should be given f. o. b. point of shipment. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, referring to Inquiry No. 34539.

A commercial agent in Canada desires to secure an agency for the sale of heavy chemicals and paper mill supplies. References. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, referring to Inquiry No. 34526.

Representative of Large Scandinavian Company Visits America

Hjalmar Wessel, chairman of the Board of Directors of A. S. Borregaard, Kristiania & Sarpsborg, Norway, manufacturers and exporters of chemical and mechanical wood pulp, paper of various kinds, turpentine, liquid rosin and methyl alcohol, recently spent about three weeks visiting our mills and studying the business conditions of this country.

The firm of A. S. Borregaard has branches in London and Manchester, England, and is capitalized at over four million pounds sterling. Mills in Norway, Sweden and Austria comprise its holdings, and they are also forest and ship owners.

Jerome Franc, formerly on the selling staff of the Union Card and Paper Company, of New York, and Wilfred Graham, also with the same concern prior to joining the W. Graham Company, have formed a new paper jobbing firm under the name of the Franc-Graham Paper Company, with offices at 132 Nassau street, New York City. The concern will handle a complete line of paper, cardboard, envelopes and specialties.

Colors for Paper

We offer a complete line of Acid, Basic and Direct Colors in a variety of Shades suitable for all grades of paper.

Acid Violet
Acid Bordeaux B
Delaware Fast Red
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Auramine
Victoria Blue
Methylene Blue O
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Malachite Green
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Samples matched in our Laboratory

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All Grades for Paper Mills

Detroit Chemical Works
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Paper Company

"Wolverine"
Waxed Papers
for Every Requirement

Best Quality

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Machine Finish Writings

Machine Finish and Super Calender White and Colored Book

Extra Machine Finish and Super Calender Litho

Mimeograph and Specialties

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Otsego, Mich.

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Offset Blanks Offset Bristols

Porcelain, Peninsular and Purity Enamel Book

M.F. and S&SC Book and Catalog

English Finish Opaque

Coated Blanks
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New Papers

Writing—	
White rag	18.45
White sulphite, No. 1	13.20
Colored	15.22
Ledger—	
White rag	19.50
White sulphite	14-25
Colored sulphite	16-26
Colored rag	21-50
Bonds—	
White rag	14-45
White sulphite	12-22
Colored sulphite	14-24
Colored rag	16-45
Book—	
No. 1 S. & S. C.	10.50-11.50
Machine finished	8.50- 9.50
English finished	9.50-10.50
Coated and enameled	12.00-14.00
Lithograph, M. F.	12.00-14.00
News Print—	
Rolls, contract	5.00- 5.50
Rolls, transient	5.00- 5.50
Sheets	6.00- 6.50
Side runs	4.00- 4.50
Cover Stock—	
Coated, both sides	10.25-
Coated, one side	10.20-
Wrappings—	
No. 1 kraft	7.00- 8.00
No. 2 kraft	6.00- 7.00
Boards—	New York and Chicago
Solid news	35.00-40.00
Straw	35.00-40.00
Plain chip	30.00-35.00
White coated chip	55.00-60.00
Manila coated chip	50.00-55.00
Binders board	75.00-85.00

Canadian Pulp & Paper Exports

Canadian exports of pulp and paper for the month of February were valued at $8,668,815, compared with $9,391,927 in February 1920, a loss of $723,112, and were $994,236 below those of the preceding month. The month's returns mark the first actual net decline in the total value of these exports in a period of almost four years during which the saving has been consistently upward. The decline affected all grades of paper and pulp except book paper, which shows an increase of 3,742 cwts. for the month. The decline in value is less marked than the decline in volume, newsprint showing a falling off of 10,497 tons, chemical pulp 18,987 tons and mechanical pulp 9,018 tons as compared with February last year. The figures show:

February—	1920.	1921.
Paper	$6,304,388	$7,039,839
Chemical pulp	2,615,156	1,384,927
Mechanical pulp	472,383	244,049
Total	$9,391,927	$8,668,815

The paper exports for the month included 5,768 cwts. of book paper, valued at $89,220; 1,056,706 cwts. of newsprint, valued at $6,255,050, and other paper valued at $694,569.

Pulp exports included 103,520 cwts. of sulphate (kraft) valued at $471,722; 65,623 cwts. of bleached sulphite, valued at $431,750; 115,162 cwts. of unbleached sulphite, valued at $481,455 and 86,464 cwts. of groundwood pulp, valued at $244,049.

Countries of destination were: Paper—United Kingdom $138,687; United States $5,818,447; other countries, $1,082,705. Pulp—United Kingdom $106,816; United States, $1,263,338; other countries $258,822.

Unmanufactured pulpwood to the amount of 195,037 cords, valued at $2,774,159 was exported to the United States during the month, compared with 52,351 cords, valued at $539,429 in February, 1920.

For the first eleven months of the current year, April to February inclusive, pulp and paper exports reached a total value of $151,247,868, compared with $92,968,105 for the corresponding period of 1920 and with $74,569,120 in 1919, a gain of $58,279,763 over 1920 and of $76,678,748 over 1919. They were made up as follows:

Eleven months—	1920	1921
Paper	$56,022,212	$82,217,694
Chemical pulp	29,124,782	52,822,448
Mechanical pulp	7,821,111	16,207,726
Total	$92,968,105	$151,347,868

Exports of unmanufactured pulpwood for the eleven months' period amounted to 1,438,149 cords, valued at $19,171,099, compared with 790,628 cords, valued at $7,956,819 for the corresponding period in 1920, and with 1,449,117 cords, valued at $13,978,157 in 1919, all of which went to the United States.

Henry Schott Joins Seaman Paper Co. Staff

The Seaman Paper Company announces the election of Henry Schott as Vice-President, and his appointment as General Manager, with headquarters in Chicago.

Mr. Schott recently resigned as Vice-President in charge of Sales and Advertising of Montgomery Ward & Company, where he had been for the past five years. Previous to that time he was in the advertising business as President of The Ferry-Hanly-Schott Advertising Company, which is now the Ferry-Hanly Advertising Company, with offices in Kansas City, Chicago and New Orleans.

Mr. Schott has been in the newspaper and advertising work all his life, beginning his newspaper work on leaving college, with the Leavenworth (Kansas) Times, which was then owned by Col. D. R. Anthony. Later he joined the editorial staff of the Kansas City Star and Kansas City Times, where he remained for twelve years, under the direction of William R. Nelson.

The somewhat unusual business experience of Mr. Schott, having been in editorial and business sides of newspapers, and later in advertising and mail order work, should make him particularly fitted for the work he has undertaken.

The appointment took effect April 11th.

The Kennelly Paper Company, mill agents of New York City, has increased its capital stock from $75,000 to $100,000.

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114 Liberty St., New York
EXPORT
All Grades of WRITING—BOOK—NEWS—WRAPPING
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A. SALOMON, Inc.
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Paper Makers Supplies
SOLE AGENTS U. S. *and* CANADA *for*
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Alum
(BOTH COMMERCIAL and FREE FROM IRON)
Casein, Satin White, English China Clay, Crystal Boro Phosphate
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Get *Invincible* Prices on
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We are also Headquarters for:
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MANUFACTURERS OF
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Bleached and Unbleached
WOOD PULP
of Every Description
M. GOTTESMAN & COMPANY
INCORPORATED
18 East 41st Street NEW YORK, N. Y.
Established 1886

Chemical Pulp

Increasing dullness is the outstanding characteristic of the imported wood pulp market. Paper manufacturers are doing very little buying, either of spot stocks or of pulp for forward shipment from primary sources, which condition is rather to be expected in view of the quietness prevailing in the paper trade. The lack of demand is forcibly reflected in the very light arrivals of pulp from abroad into the United States during the past few weeks. Importations have dropped off to a point where they are almost nil, with importers asserting that about the only supply being received being pulp which was bought some time ago on contract.

The position of the imported pulp market, it is contended by representative importers, during the next few months depends largely on the extent to which Finland operates in the American market. It is stated that if Finnish manufacturers ship the large tonnage to this country that they now appear likely to, prices on foreign pulps will probably go below prevailing quotational levels. On the other hand, it is argued that if American buyers have to depend on Swedish pulp for the bulk of their requirements, the probabilities are prices will be maintained at about ruling levels and may advance. Sweden, it is claimed, is not producing her normal amounts of wood pulp, and manufacturers in that country are laboring under very high production costs, either of which factors is believed to be sufficient to sustain quotations to American buyers.

Germany is shipping some sulphite and kraft pulp to the United States, but not enough to cut much of a figure in this market. A novel feature of the trade is that some importers are bringing in sulphite from Japan which was purchased by that country from Scandinavian producers during the war period and which is now being marketed in the United States at cheaper prices than Swedish manufacturers are willing to sell.

Prices on foreign pulp are very irregular. In the absence of demand, some lots are being sold at a loss to importers; in other instances, consumers in quick need of supplies are paying the top figures asked, thus placing quotations on a broad range. Bleached sulphite has sold in at least some cases down to 6 cents per pound ex warehouses in this country, and unbleached sulphite at 4.50 cents for the No. 1 grade. Kraft is offered at 3.50 to 3.75 cents without attracting many buyers. Easy bleaching sulphite is about the firmest item and is quoted at a minimum of 5 cents ex dock or warehouse. Arrivals at New York in March and approximate current market quotations follow:

Bleached sulphite	$ 6.00- 6.50
Unbleached sulphite, No. 1	4.50- 5.00
Easy bleaching	5.00- 5.25
Mitscherlich unbleached	4.75- 5.00
Kraft	3.50- 3.75
Ground wood, per ton	40.00-50.00

National City Bank, 498 bls. from Gothenburg; New York Overseas Co., 397 bls. from Kobe; Columbia Bank, 1,555 bls. from Kobe; Lagerloef Trading Co., 10,168 bls. from Hango; Overseas Export and Import Co., 9,000 bls. ground wood from Hammelvik; Scandinavian-American Trading Co., 1,500 bls. from Norrkoping; Nilsen, Rantoul Co., 200 bls. from Hull; Brown Bros. & Co., 212 bls. from Hamburg; Tidewater Paper Mills Co., 6,433 bls. ground wood from Liverpool, N. S.

Paper Stock

Importations of paper stock have steadily declined in recent months until they are almost as light as during the latter part of the war period. Arrivals from foreign sources during March were unquestionably smaller than for any month since the movement of supplies from Europe to the United States was resumed shortly after the armistice, and prospects are few sizable lots of rags, ropes, bagging or other materials will be brought into the country until demand from paper mills appreciably improves. Illustrative of the falling off in imports of papermaking supplies, the latest Government figures available show that in January last 6,832,972 pounds of papermaking rags were imported into the United States, as compared with 12,002,492 pounds in December last, 16,239,478 pounds last November, and 40,190,333 pounds last June, at which time the after-the-war movement of rags from Europe to the American market reached its crest.

The small amounts of paper stock now being imported, of course, is a reflection of the dull market condition prevailing. Importers are buying almost solely against direct orders from mill customers, and the latter are but little attracted by the low prices ruling on most grades of stock. From all reports, there are fairly large accumulations of rags and other papermaking materials in European countries, and while most owners of these goods are not pressing their representatives here to sell, preferring to wait out the American market, others are anxiously endeavoring to liquidate at least a part of their holdings for whatever they can obtain from American buyers. Receipts of paper stock at the port of New York in March were:

Old Rope

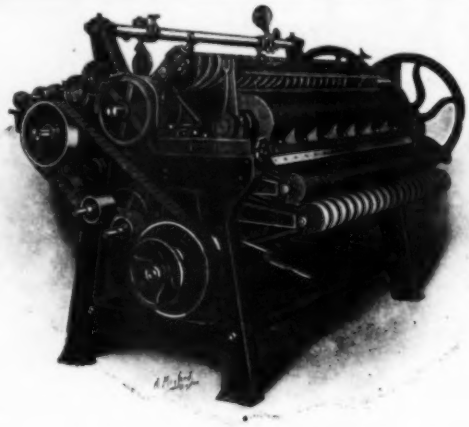
Old Colony Trust Co., 96 coils from Leith; Brown Bros. & Co., 198 coils from Bristol and 154 coils from Hull; Irving National Bank, 205 bls. from Copenhagen.

Old Bagging

Edwin Butterworth & Co., 146 bls. from Havre and 234 bls. from Antwerp; Goldman, Sachs & Co., 327 bls. from Rotterdam; Irving National Bank, 64 bls. from Leith; Order, 384 bls. from Antwerp and 268 bls. from Havre.

Rags

Maurice O'Meara Co., 189 bls. from London; American Woodpulp Corporation, 708 bls. from Hamburg; A. Katzenstein, 200 bls. from Antwerp; Castle, Gottheil & Overton, 48 bls. from Rotterdam, 421 bls. from Bordeaux and 293 bls. from Antwerp; Daniel M. Hicks, Inc., 30 bls. from Glasgow; Paul Berlowitz, 464 bls. from Havre; George W. Millar & Co., 81 bls. from Rotterdam; Salomon Bros. & Co., 86 bls. from Rotterdam; Wilkinson Bros. & Co., 28 bls. from Rotterdam; Goldman, Sachs & Co., 484 bls. from Havre and 195 bls. from Antwerp; Ladenburg, Thalman & Co., 586 bls. from Antwerp and 138 bls. from Glasgow; Old Colony Trust Co., 22 bls. from Antwerp; Brown Bros. & Co., 1,332 bls. from Antwerp and 228 bls. from Rotterdam; Equitable Trust Co., 512 bls. from Havre, 455 bls. from Rouen and 448 bls. from Antwerp; Mechanics & Metals National Bank, 715 bls. from Rouen, 248 bls. from Rotterdam and 77 bls. from Antwerp; Chemical National Bank, 730 bls. from Rotterdam; National City Bank, 372 bls. from Copenhagen; State Bank, 145 bls. from Antwerp; S. Rubens & Bro., 11 bls. from Rotterdam; G. Mathes Co., 73 bls. from Rotterdam; Excel Remnants Co., 23 bls. from



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PATENT TOP SLITTERS

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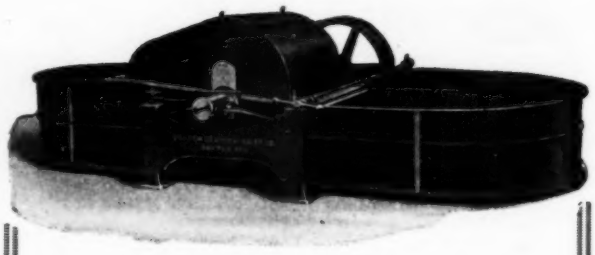

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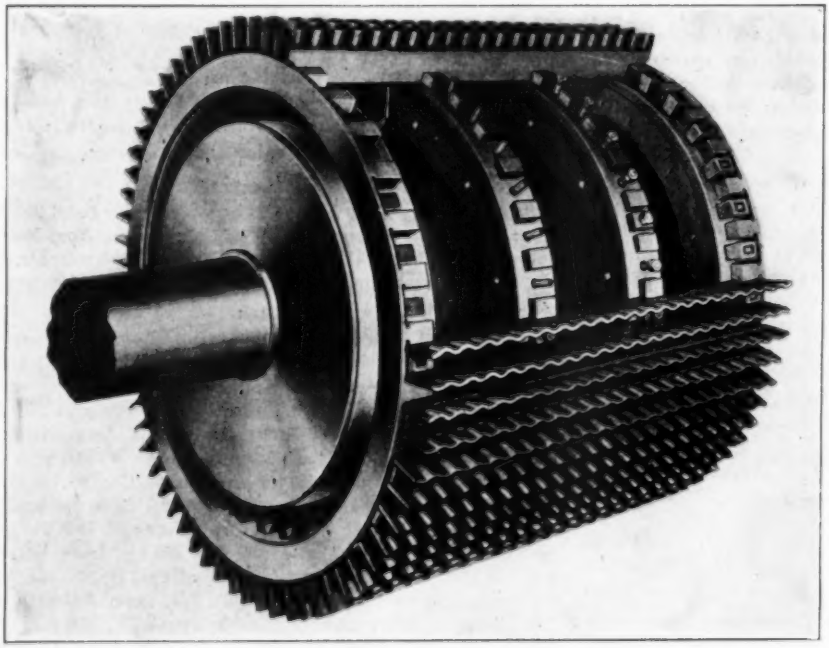
Dayton Beater and Hoist Co.
DAYTON, OHIO



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3. Lugs on heads machine finished insuring a perfect fit.
4. Bars require no shimming.
5. Wedges self centering.
6. Wedges drawn down by heavy wrought iron bolts with brass nuts.
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8. Damaged bars can be replaced without disturbing the others.
9. It is unnecessary to raise roll from bearings when refilling.
10. Roll can be refilled in one-fourth the average time.

DAYTON GLOBE BANDLESS BEATER ROLL

WE SOLICIT YOUR INQUIRIES

DAYTON GLOBE IRON WORKS, Dayton, Ohio

Rotterdam; Order, 296 bls. from Havre and 320 bls. from London.

Miscellaneous Paper Stock

Ladenburg, Thalman & Co., 160 bls. from Dundee; Albion Trading Co., 21 bls. from Rotterdam; Irving National Bank, 85 bls. from Dundee and 89 bls. from Hull; Order, 80 bls. from Christiania.

Paper

Imports of finished paper into the United States were fairly heavy in March, judging from the manifests of vessels unloading at the port of New York during that month. Despite the slowing up of demand in this country for newsprint, receipts of print paper from Europe through the port of New York last month were larger than in February, approximately 30,000 rolls being brought in, as against about 24,000 rolls in the preceding month, which would indicate that Swedish and German manufacturers are still marketing quite a part of their output of print paper in this country. Latest Government statistics show that Germany shipped 4,061 tons of newsprint to the United States in January last, compared to more than 14,000 tons in December, 1920.

Germany also is sending fair amounts of wrapping paper to this market, while importations of cigarette paper, principally from France, and of filter, hanging and drawing papers from various sources in Europe continue about normal. Imports of paper board have declined, although occasional large shipments are being received from Holland and Germany. Paper imports at the port of New York in March follow:

Cigarette

American Tobacco Co., 166 cs. from Rouen, 200 cs. from Bordeaux and 175 cs. from Havre; P. Lorillard Co., 40 cs. from Rouen and 162 cs. from Havre; D. Rodriquez, 2 cs. from Sevilla; R. J. Reynolds Tobacco Co., 180 cs. from Bordeaux; P. J. Schweitzer, 56 cs. from Bordeaux; Wilkinson Bros. & Co., 6 cs. from Havre; W. Duke Sons Co., 25 cs. from Havre; Surbrug Co., 11 cs. from Havre; Rose & Frank Co., 22 cs. from Havre; Gerhard & Hey, 8 cs. from Hamburg; B. E. Teale, 98 cs. from Bristol; Liggett & Myers Tobacco Co., 35 cs. from Bordeaux; H. Reeve Angell & Co., 24 cs. from Helsingfors.

Printing

National City Bank, 3,236 rolls from Hamburg and 45 cs. from Rotterdam; Pulp & Paper Trading Co., 132 rolls from Hamburg; Guaranty Trust Co., 830 rolls from Hamburg; C. L. Robinson, 14 rolls from Gothenburg and 8 rolls from Copenhagen; B. F. Drakenfeld & Co., 49 cs. from Liverpool; Globe Shipping Co., 122 rolls from Hamburg; New York American, 7,527 rolls from Hallstavik; First Federal Foreign Banking Assn., 1,347 rolls from Helsingfors and 564 rolls from Hango; American Foreign Banking Corp., 2,782 rolls from Helsingfors and 220 rolls from Hango; U. S. Forwarding Co., 490 rolls from Hamburg; Chatham & Phenix National Bank, 457 rolls from Hango; F. L. Kraemer & Co., 5 cs. from Bremen; R. E. Schneider, 2 rolls from Antwerp; Bank of Chosen, 92 cs. from Dairen; H. Reeve Angell & Co., 2,227 rolls from Helsingfors; Oxford University Press, 17 cs. from Liverpool; Union Alliance Corp., 2,403 rolls from Norrkoping; New York Overseas Co., 558 rolls from Skien and 169 rolls from Brevik; Irving National Bank, 402 rolls from Helsingfors; Ronconi & Miller, 246 rolls from Norrkoping; Chemical National Bank, 753 rolls from Norrkoping; B. F. Drakenfeld & Co., 35 cs. from Liverpool; Order, 3,191 rolls from Gothenburg, 395 rolls from Hamburg, 348 rolls from Christiania, 1,785 rolls from Helsingfors and 466 rolls from Christiansand.

Wrapping

Republic Bag & Paper Co., 1,908 rolls from Hamburg; First National Bank of Boston, 99 cs. from Hamburg; Maurice O'Meara Co., 63 rolls from Puerto Plata; Pulp & Paper Trad-

EASTWOOD
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Fourdrinier Wires
Cylinder and Washer Wires

Belleville, New Jersey
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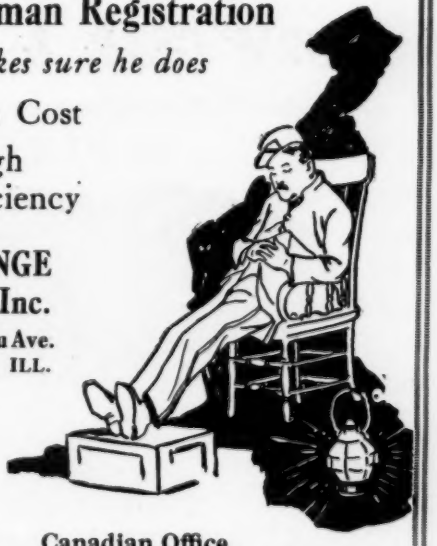

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WE DO IT FOR OTHERS, WHY NOT FOR YOU?

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OUR 50 YEARS EXPERIENCE IS YOURS FOR THE ASKING

WILLIAM GANSCHOW COMPANY
Washington Blvd. and Morgan Street, Chicago, U. S. A.

ing Co., 193 bls. from Hamburg; Pacific Bank, 65 rolls from Gothenburg; H. Reeve Angell & Co., 34 bls. from Helsingfors; American Express Co., 44 cs. from Hull; First National Bank of Chicago, 63 cs. from Hamburg; R. F. Lang, 6 bls. from Hamburg; Order, 151 cs. from Hamburg.

Hanging

Prager Co., 4,690 pkgs. from Antwerp; Gregory, Brown & Co., 2 cs. from Antwerp; W. H. S. Lloyd & Co., 28 bls. from London and 16 bls. from Liverpool; A. Murphy & Co., 4 bls. from Liverpool and 1 cs. from London; R. F. Lang, 3 bls. from London; A. C. Dodman, Jr., 3 bls. from Liverpool and 6 bls. from Antwerp; A. E. Buckley, 5 cs. from Liverpool; Bech, Van Siclen & Co., 3 cs. from Kobe and 5 cs. from Hong Kong; R. F. Downing & Co., 11 bls. from London; State Forwarding & Shipping Co., 5 bls. from Hamburg; Yaunma & Co., 5 cs. from Tokio; F. A. Bruder, 4 bls. from Bremen; Order, 137 bls. from Hamburg and 4 cs. from Yokohama.

Writing

F. C. Strype, 27 cs. from Antwerp; Keuffel & Esser Co., 5 cs. from Hamburg; Goodman & Levy, 5 cs. from Havre; J. W. Hampton, Jr., & Co., 11 cs. from Hamburg; T. Nevin, 3 cs. from London; Meadows, Wye & Co., 9 cs. from Liverpool; G. W. Sheldon & Co., 4 cs. from Havre; Order, 13 cs. from Havre and 6 cs. from Rotterdam.

Drawing

Lunham & Moore, 18 cs. from London; Keufel & Esser Co., 188 cs. from Hamburg; American Shipping Co., 17 cs. from Hamburg; Fleitmann, Pilcer & Co., 2 cs. from Antwerp.

Tissue

Meadows, Wye & Co., 12 cs. from Liverpool; Wilkinson Bros. & Co., 21 cs. from Liverpool; Davis, Turner & Co., 8 cs. from Liverpool; Order, 4 cs. from Yokohama and 6 cs. from Palamos.

Filter

Lunham & Moore, 28 cs. from London; P. H. Petry & Co., 4 cs. from Gothenburg; J. Manheimer, 112 bls. from Bordeaux.

Boards

American Express Co., 2 cs. from Hamburg, 208 cs. from Liverpool and 8,102 bdls. from Rotterdam; Irving National Bank, 736 rolls from Rotterdam; Star Corrugated Box Co., 3 rolls from Rotterdam; Hermes Bros., 12 cs. from Hamburg; Atlantic Forwarding Co., 2 rolls from Hamburg; A. H. Ringk & Co., 3 cs. from Hamburg; Manufacturers Trust Co., 1,166 rolls from Antwerp; L. Weissberg, 114 bls. from Hamburg; Fibre Case & Novelty Co., 30 bls. from Gothenburg; Equitable Trust Co., 96 bls. from Helsingfors; Lincoln Trust Co., 130 rolls from Rotterdam; Prager Co., 3 cs. from Hamburg; F. B. Vandegrift & Co., 10 cs. from Antwerp; Magher-Devoy Shipping Co., 7 cs. from Bremen; Order, 126 bls. from Hamburg and 566 rolls from Rotterdam.

Miscellaneous

Irving National Bank, 43 pkgs. from Antwerp and 45 cs. from Hamburg; Knauth, Nachod & Kuhne, 10 cs. from Hamburg; Baldwin Shipping Co., 17 cs. from Hamburg; Wilkinson Bros. & Co., 26 rolls from Gothenburg; Hart Trading Co., 26 cs. from Gothenburg; P. Puttmann, 80 cs. from Antwerp; Philadelphia Foreign Trading Co., 30 cs. from Hamburg; Pendix Paper Co., 13 bls. from Hamburg; G. W. Sheldon & Co., 33 cs. from Havre; Rose & Frank Co., 3 cs. from Havre; American Express Co., 23 bls. from London, 130 bls. from Liverpool and 141 pkgs. from Hull; Equitable Trust Co., 38 cs. from Hamburg; Goodman & Levy, 14 cs. from Havre; Louis Dejong & Co., 100 rolls from Rouen; R. Keating, 511 bls. from Antwerp; W. Hanermann, 5 cs. from Antwerp; Causon & Montgolfer, 6 cs. from Havre; J. W. Hampton, Jr., & Co., 4 cs. from Havre; Clauss, Portenoy Co., 4 cs. from Havre; E. Daiber, 46 cs. from Antwerp; Wackum &

The CHICAGO Approved Portable WATCHMAN'S CLOCK

with its special Waltham movement, its lock stations and its superior quality throughout, is especially desirable for mills and factories and for either in-door or out-door patrol.

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9 Church Street, NEW YORK
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Guaranteed Perfect

Draper Hollow Balanced Brass Balls

FOR STUFF PUMPS

Absolutely balanced; will not pound out of shape

Specify these when ordering new pumps.

Order these to replace worn-out balls.

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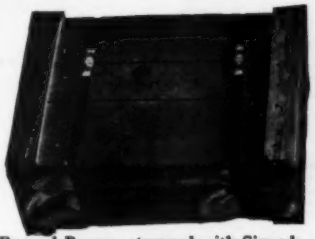
Every ball bears our registered trade-mark

SIGNODE SYSTEM



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Signode straps insure delivery of framed paper bundles in the same condition they leave the mill. Cheaper than rope. No battered corners. Liberal trial arrangement.

Write for Particulars and Prices

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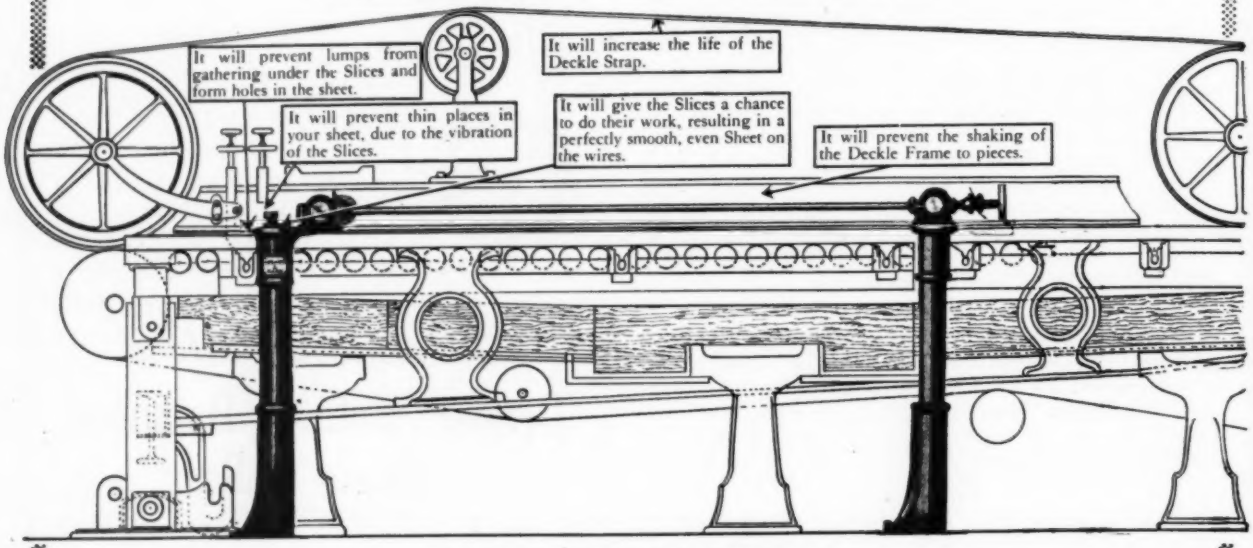
The Acme Deckle Frame Support

"is indispensable to the making of Good paper"


It will prevent lumps from gathering under the Slices and form holes in the sheet.
It will increase the life of the Deckle Strap.
It will prevent thin places in your sheet, due to the vibration of the Slices.
It will give the Slices a chance to do their work, resulting in a perfectly smooth, even Sheet on the wires.
It will prevent the shaking of the Deckle Frame to pieces.

It will make better edge, save breaks and take less power.

Manufactured and Distributed by

HUBAND & NASH

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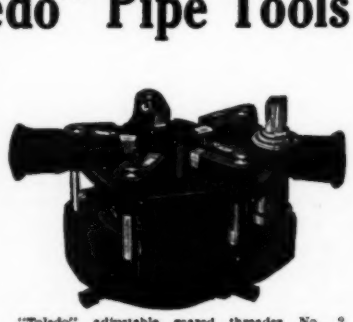
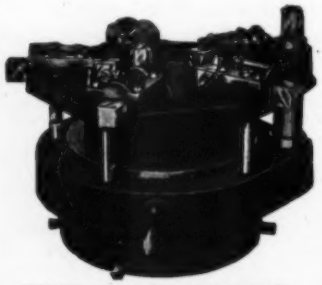
Most of the best mills in this country are equipped with this device.

Fast, accurate pipe-fitting with "Toledo" Pipe Tools

THE "Toledo" line of Threaders, Cutters and Power Drives represents pipe-fitting equipment which cannot be equalled for accurate work, fast performance and general utility. They are ideal for quick emergency work and equally capable of handling the biggest, most complicated pipe fitting jobs. Send for catalog and Power Drive bulletin.



"Toledo" adjustable geared threader No. 2, capacity 2½ to 4-inch pipe inclusive. A light, portable device that threads fast and accurately. Other adjustable hand threading devices for pipe from ⅛ up to 12 inches.



"Toledo" geared adjustable threader No. 23, capacity 2½ to 6-inch pipe inclusive. The patented construction of this threader eliminates weaknesses generally found in devices where camplate principle is used for die adjustment to various sizes.

"Toledo" Power Drive for operating "Toledo" Geared Pipe Tools

Cut to left shows "Toledo" Drive operating "Toledo" Cutter No. 250. Capacity of cutter is 2½ to 6-inch pipe inclusive. Cuts clean and straight, leaving no burr. Power Drive is interchangeable and will drive ALL "Toledo" geared tools; it is simply constructed, portable and will operate any tool FIVE times faster than hand operation with ratchet handle or driving cross.

THE TOLEDO PIPE THREADING MACHINE CO. **TOLEDO, OHIO**

NEW YORK OFFICE: 50 CHURCH STREET, NEW YORK CITY

McLaughlin, 4 cs. from Antwerp; H. W. Robinson 9 cs. from Hamburg; Van Oppen & Co., 3 bls. from Rotterdam; U. S. Forwarding Co., 25 cs. from Hamburg; A. Stauff, 10 cs. from Hamburg; Newark Paraffine Parchment Paper Co., 25 cs. from Hamburg; Faumn & Co., 3 cs. from Hamburg; Gallagher & Ascher, 8 cs. from Hamburg; Kupfer Bros., 15 cs. from Hamburg; D. J. Coenca & Co., 6 cs. from Havre; Birn & Wachenheim, 8 cs. from Rotterdam; T. D. Downing & Co., 2 cs. from Havre; Zellerbach Paper Co., 2 cs. from Hamburg; B. J. Riley Paper Co., 9 cs. from Antwerp; Defender Photo Supply Co., 4 cs. from Antwerp; Martin & Bechtold, 25 cs. from Hong Kong; Judson Freight Forwarding Co., 2 cs. from Copenhagen; Ault & Wiborg Co., 70 cs. from Hong Kong; E. Bennecke & Bros., 35 cs. from Hong Kong; Whiting & Patterson Co., 2 cs. from Havre; Favor, Ruhl & Co., 7 cs. from Havre; M. J. Corbett & Co., 42 cs. from Hamburg; National City Bank, 17 cs. from Hamburg and 17 cs. from Antwerp; Japan Paper Co., 15 cs. from Havre and 108 cs. from Genoa; L. A. Consmiller, 143 cs. from Rotterdam; Billwiller Bros., 4 cs. from Rotterdam; Order, 37 cs. from Antwerp and 13 bls from Hamburg.

Reports Business Improving

"Conditions are showing a marked improvement," says Mr. E. W. Twitchell, Treasurer of Auer & Twitchell, Inc., of Philadelphia and New York. "Within the past month we have noticed a confirmed strengthening in the market. The demand is increasing, and our mills are running more nearly normal. Especially is the demand improved on towels and tissue, while board is showing a revival."

The slogan, "1921 rewards fighters" has been adopted by the Auer & Twitchell Organization, and they are proceeding on this assumption.

J. F. Auer, President of Auer & Twitchell, Inc., reports: "We believe the crisis has been passed, and that business in general is on the upward trend. Evidence gathered from personal observations, and reliable sources indicate that the strengthening of the market in general is not temporary, but is due to the natural resumption of normal demand for all kinds of paper."

In addition to a general line of coarse papers, this organization is handling specialties, such as gummed tape, fancy papers, glassine and glassine bags, and finds that business in general is continuing to improve.

It is the opinion of both Messrs. Auer and Twitchell that the better part of the slump experienced has been a frame of mind; that everybody has been stating Spring would see the opening, and now that Spring is here, the natural optimism which everybody has had with regard to business in general is bearing fruit.

Their plans for expansion have gone steadily ahead, refusing to be discouraged, or frightened by false alarms, and prospects for a very good year in 1921 are growing brighter every day.

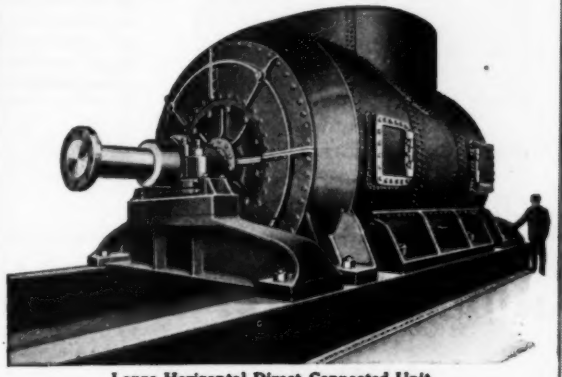
The Conveyors Corporation, of America, Chicago and New York, announce the appointment of Mr. Robert B. M. Wilson as Sales Engineer of the Chicago district. With him will be associated as an assistant, Mr. E. M. Wolfe. Headquarters will be maintained in the corporation's main office at 326 West Madison street. The Conveyors Corporation manufactures a complete line of coal and ash handling equipment.

A new idea in finger-bowls has recently been patented. It is made of paper, and on the inside of its bottom is printed an advertisement in invisible ink. When water is poured into the receptacle the printing appears. The same idea may be applied to a paper ice-cream saucer or a paper drinking cup.

Leffel Turbine Water Wheels

High Speed — High Horsepower — High Efficiency

Vertical and Horizontal Designs



Large Horizontal Direct Connected Unit

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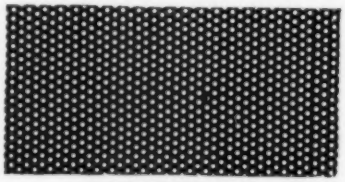
When buying a pump it is well worth your time to make a careful selection and carefully compare the various features to be considered in choosing the proper pump for the service to be performed. We would like to be of assistance in advising the purchaser the vital points which we consider of importance in making a selection and feel our fifty years' practical experience should be of some value.

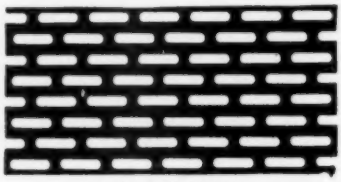
Send for Catalogue 127

DEAN BROS. STEAM PUMP WORKS. INDIANAPOLIS.

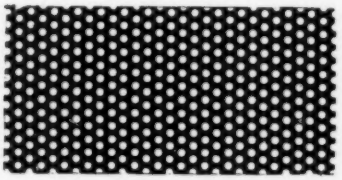
Perforated Metal Screens for Pulp and Paper Mills



.065 inch round



1/8 x 1/2" Slots



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Gibbs-Brower Bulletin

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HIGH GRADE SPECIALTY BOARD MILL—5-cylinder machine, 65" trim, steam and electricity, 20 tons construction. Also ground wood mill—15 tons production.

HARDWARE, TEXTILE and COLORED SPECIALTY MILL—Three-cylinder machine, 52" trim, water, steam and electricity; 6 tons production.

KRAFT and SULPHITE WRAPPING MILL—Fourdrinier machine trimming 61", steam; 10 tons production.

NEWS PRINT MILL—Fourdrinier machine trimming 72", water and steam, 15 tons production. Also ground wood mill 6 tons production.

LIGHT TISSUE & CREPE TOWEL MILL—54" cylinder and 76" Fourdrinier machines, excellent water power and electricity; 7 tons production.

BOOK MILL—Fourdrinier Machine trimming 78", water and steam, 6 tons production. Also dry ground wood mill—6 tons production.

BOND WRITING & LEDGER MILL—Fourdrinier machine trimming 68", electricity and steam, 10 tons production.

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